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PRESCHOOL PREDICTION AND PREVENTION OF LEARNING DISABILITIES.
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THE OBJECTIVES OF THIS INITIAL REPORT OF A FOUR-YEAR PROJECT WERE (1) TO DEMONSTRATE A METHOD FOR THE PREDICTION AND PREVENTION OF LEARNING DISABILITIES, (2) TO FOSTER UNDERSTANDING OF CHILD DEVELOPMENT AMONG TEACHERS, PARENTS, AND PHYSICIANS. SUBJECTS WERE THE 3 1/2 TO 5 1/2 YEAR OLD CHILDREN OF AN ENTIRE SCHOOL DISTRICT. RESEARCHERS WERE ASSISTED BY PARENTS AND TEACHERS. FIVE TESTS (NAMED AND EVALUATED IN THE REPORT) WERE ADMINISTERED DURING THE SUMMER OF 1966 TO 365 CHILDREN RANDOMLY ASSIGNED TO CONTROL AND EXPERIMENTAL GROUPS. THESE GROUPS WERE FURTHER DESIGNATED WITHIN THEMSELVES ACCORDING TO SEX, AGE, AND SCHOOL EXPERIENCE. TEST RESULTS INDICATED INITIAL SCREENING FOR VISION, HEARING, AND PERCEPTION TO BE HELPFUL IN PREDICTION AND PREVENTION OF LEARNING DISORDERS. ANNUAL RESCREENING WILL BE CONDUCTED FOR 3 YEARS. SUCCEEDING REPORTS WILL FOLLOW. (LG)

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PRESCHOOL PREDICTION AND PREVENTION OF LEARNING DISABILITIES

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March 1967

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San Rafael City Schools &
Marin County Superintendent of Schools Office

San Rafael, California

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INTRODUCTION

The following is a report of the initial phase of a four year project. The primary purpose of the total project is to demonstrate a method whereby learning disabilities among a *general* school population can be predicted and prevented, in whole or in part. Three and one-half to five and one-half year old children of an entire school district were invited to the schools during the summer of 1966 to be screened for evidences of potential learning disability. These children are to be rescreened annually and tested for academic achievement at the conclusion of kindergarten, first, and second grades. Matched control and experimental groups have been formed on the basis of the initial screening. The predictive validity of the initial screenings will be assessed by means of statistical comparisons of control group screening and achievement results. Screening results for experimental groups were given to schools and to family physicians with suggestions for initiating preventative assistance. An experimental sub-group, a portion of the four-year-olds, attended a summer preschool prior to entrance into kindergarten.

Another major objective of the project is to foster increased perception and understanding of child development, particularly as it is related to academic learning, among teachers, physicians, and parents.

There has been a clear recognition of the importance of early experience in relationship to intelligence and learning (Hunt, 16). Furthermore, evidence is accumulating to justify the presumption that early identification and remediation of developmental deficiencies is an effective preventative procedure. Kirk (21), for example, selected four groups of educable mentally retarded children (ages three to six), provided one group with six hours per day of an enriched nursery school environment in the community prior to school entrance, provided a second group with a similar experience in an institution, and formed contrast groups for these two experimental groups. Both of the experimental groups made significantly greater gains in IQ's and SQ's on the *Binet*, *Kuhlmann*, and *Vineland* tests than did the contrast groups.

Project Head Start has, of course, recently facilitated a vast accumulation of data to support the notion that early identification and remediation of culturally disadvantaged children promotes intellectual and educational growth. One of the early projects in this area was reported by Weaver (35), who found that ten weeks of summer training for culturally disadvantaged Negro children led to IQ changes in favor of the experimental groups of as much as ten points. On the basis of subsequent testing on the *Illinois Test of Psycholinguistic Abilities*, the experimental groups surpassed the control group in the ability to comprehend visual information (Visual Decoding) and to associate auditory information with verbal expression (Auditory-Vocal Association).

The foregoing results are gratifying to see, but there is an apparent need to extend the concept of early identification and remediation to the general population of children. Learning disabilities occur in all social, ethnic, and economic groups. When grade retentions, underachievement, and remedial programs are all considered, even school districts in high socio-economic areas would be likely to find that learning failures in the public school consume many thousands of dollars of the school budget. Of course, the personal expense to children who fail in school cannot be measured. It is clear, however, that provision of success in school is one of the most powerful mental health tools at our disposal.

Perhaps a significant proportion of learning failures and their consequences can be prevented, in whole or in part, if school districts would invest a few of their "failure" dollars in identifying and modifying developmental lags among children within the general population. If such prevention can be demonstrated, one could properly ask if any district in the nation can afford not to invest a portion of its regular budget toward early identification and prevention.

There is also an apparent need to examine the possibility that early identification and prevention among general populations can be achieved prior to entrance into kindergarten. The vast majority of efforts to develop screening scales for these purposes have, to date, been directed toward the kindergarten age level. The work of de Hirsch (11) is particularly noteworthy in this area, and there are a large number of other contributions of significance (1,4,6-10, 12,14,15,17,20,22-27,30-34,36).

There is relatively little time to work with children who are experiencing difficulties between the time that they enter kindergarten and the time that formal reading and other instruction begins in most school systems. Even the beginning kindergarten requirements for listening, looking, manipulating materials, etc., are too advanced for many children in normal kindergartens and the pattern of failure has begun before they ever are asked to open a book. It is quite possible that the optimal times to assist children in the "readiness" areas which promote success in school is prior to kindergarten entrance. Some are convinced, although there is lack of research in this area, that such screening and assistance can be carried out with children at least as young as three and one-half years of age and that the provision of longitudinal data on children prior to their entrance into public kindergarten will facilitate development of improved primary cirricula (3).

METHOD

Parent volunteers made appointments for each child and its parents to attend summer screening sessions at the neighborhood school. Children aged four and one-half years to five and one-half years who were enrolled in the summer pre-school session were screened during these sessions. The rest of the children came to a neighborhood school (all ten elementary schools were used as sites) for a period of one and one-half hours. A team of ten teachers administered individual "readiness" screening tasks with the supervision of school psychologists. A school nurse screened each child's vision and hearing. Parents observed all aspects of screening of their child in order to encourage a "teamwork" attitude between parent and school and in order to effect direct communication to parents of relative developmental strengths and weaknesses of their children.

Teachers adminstered the following instruments to all children: Illinois Test of Psycholinguistic Abilities (18), The Developmental Test of Visual-Motor Integration (5), Kephart Perceptual-Motor Rating Scale (29), Peabody Picture Vocabulary Test (28), and Teacher's Behavioral Rating Scale. (This is an extensive battery, but one of the expected contributions of this project would be the production of statistical evidence that the size of the battery can be reduced without loss of predictive power.) The nurse conducted pure tone audiometric screening and threshold tests where doubtful screening results were obtained. Visual screening was done by means of the Titmus preschool optical plates.

Rescreening will be conducted on the same children each summer for the next three years. Yearly screening results will be correlated with each other and with standardized achievement measures made at the end of each school year. This procedure will allow assessment of:

1. Yearly changes in abilities to process information which are associated with and without developmental guidance.
2. Yearly achievement changes which are associated with and without developmental guidance.
3. Differences between groups which received guidance from age three, and groups which received guidance from age four, and between groups which attended and which did not attend preschool.

Once the screening data was obtained, children with obviously severe difficulties were referred to family physicians. The remainder of the children were assigned to experimental and control groups by means of matching on (1) sex, (2) chronological age, (3) mean ITPA Language Age, (4) prekindergarten experience, and (5) profile similarity. The results for experimental children were forwarded to their school of future attendance and to their family physician or pediatrician with suggestions for preventative guidance and an invitation to consult with the professionals conducting the project regarding preventative guidance.

Teachers who participated in the screening activities began a year long series of weekly workshops designed to increase their awareness of "readiness" factors related to academic learning and to formulate improved classroom and individual methods of meeting the developmental needs of children in kindergarten and first grade.

RESULTS

Out of the approximately 1200 children in the district who might have been eligible for screening, just under 400 were enrolled by their parents. Appointments for 19 of the enrolled children were not kept. Screening was completed on 377 of the enrolled children. Of this 377, 12 (7 boys and 5 girls) children were dropped from the study and referred, with the screening data, to their family physicians for further assistance because of the obvious seriousness of their developmental difficulties. The remaining 365 children were randomly assigned to groups. Table 1 shows the number of children in each group and the means and standard deviations for chronological ages within each group and combination of groups.

Teacher Screening

Table 2 gives the numbers associated with the 15 teacher screening variables which will be found in various tables and appendices within this report.

Adequacy of matching of various groups and combinations of groups is indicated in Table 3, which contains statistics for differences of means between comparison groups. Of the 120 tests between experimental and control groups, 4 were significant at the .05 level and one was significant at the .01 level of statistical signifance. These statistically significant differences might, therefore, have been obtained on the basis of chance alone. Matching between males and females was not attempted, but statistical comparisons of group means of males and females are also shown in Table 3. No statistically significant differences were found between the males and females below 55 months of age, but 4 of 15 differences were statistically significant at the .05 level between males and females over 54 months of age. The means and standard deviations, as well as the product moment intercorrelations for each of the groups on each of the 15 variables will be found in Tables A through K in the Appendix of this report.

Group means for all age level variables have been profiled for each of the experimental-control and contrast group comparisons and are shown in Figures 1 through 10. Levels of statistical significance of differences between means are indicated on the profiles in cases where these levels were .05 or better. It can be readily noted that the profiles of the various comparison groups are essentially the same, with significant differences obtaining only in the cases of younger vs. older children (Fig. 1) and older males vs. females (Fig. 2). However, success of matching for young female experimental and control groups (Fig. 9) appears to be less adequate than for other groups in view of the consistency with which control group means fell below those of experimental group means on subtest results.

TABLE 1

SAMPLE SIZE AND AGE FOR EXPERIMENTAL AND CONTROL GROUPS*

Group	N	$\bar{X}$ Age	Sigma	$\bar{X}$LA	Sigma
4-Me	25	49.16	2.99	57.72	10.54
4-Mc	25	49.44	2.53	57.72	9.80
4-Fe	28	49.22	3.66	59.03	11.85
4-Fc	28	49.44	3.20	55.96	11.14
5-Me	35	62.40	4.24	68.51	11.51
5-Mc	35	62.97	5.02	67.88	10.56
5+Me	29	62.31	3.21	66.62	9.79
5+Mc	29	62.31	3.67	66.17	9.70
5-Fe	36	61.69	4.87	67.41	8.87
5-Fc	37	61.56	3.65	69.40	9.98
5+Fe	29	61.72	4.01	66.58	10.66
5+Fc	29	61.17	3.21	64.79	10.04
Combined Groups					
4-M	50	49.30	2.74	57.72	10.07
4-F	56	49.33	3.40	57.44	11.49
5-M	70	62.68	4.62	68.20	10.97
5+M	58	62.31	3.42	66.39	9.66
5-F	73	61.63	4.27	68.42	9.43
5+F	58	61.44	3.61	65.68	10.30
5M	128	62.51	4.11	67.38	10.40
5F	131	61.54	3.98	67.21	9.88
4	106	49.32	3.09	57.57	10.79
5	259	62.02	4.06	67.29	10.12
TOTAL	365				

*Groups are designated as follows:
4= CA of 54 months or less,
5= CA of 55 months or more,
+= Special summer school experience,
-= No special summer school experience,
F= Female,
M= Male,
e= Experimental group,
c= Control group. Where + and - are not shown, these groups were combined. Where e and c are not shown, these groups were combined. Where M and F are not shown, these groups were combined.

TABLE 2

VARIABLES

Variable Number	
1	Chronological Age in months
2	Peabody Picture Vocabulary Test results in months
3	Visual-Motor Integration Test results in months
4	ITPA Auditory-Vocal Automatic Test results in months
5	ITPA Visual Decoding Test results in months
6	ITPA Motor Encoding Test results in months
7	ITPA Auditory-Vocal Association Test results in months
8	ITPA Visual-Motor Sequencing Test results in months
9	ITPA Vocal Encoding Test results in months
10	ITPA Auditory-Vocal Sequencing Test results in months
11	ITPA Visual-Motor Association Test results in months
12	ITPA Auditory Decoding Test results in months
13	ITPA Total Test results in months
14	Teacher Rating Scale Total
15	Modified Kephart Perceptual-Motor Rating Scale Total

TABLE 3

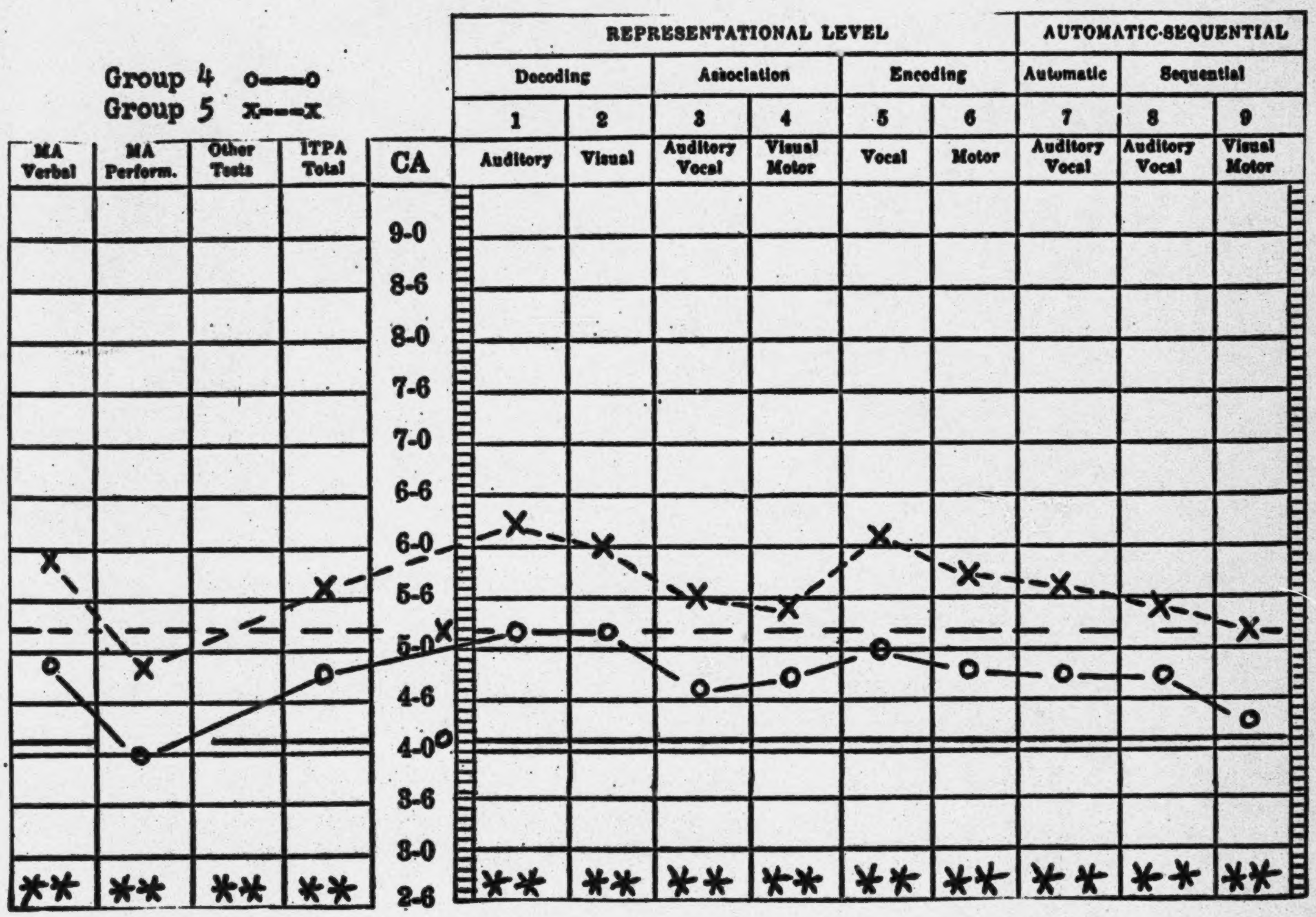
t STATISTICS FOR DIFFERENCE OF MEANS BETWEEN COMPARISON GROUPS

Comparison Groups	N's	VARIABLES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4-Me/4-Mc	25/25	0.36	-0.87	1.74	0.34	-0.47	-1.33	0.54	1.82	0.69	0.78	-1.08	0.07	0.0	1.44	2.37*
4-Fe/4-Fc	28/28	0.25	-0.08	0.24	-0.80	-0.01	-1.32	-0.91	-1.25	-1.62	-0.64	-0.82	0.18	-1.00	0.04	0.24
5-Me/5-Mc	35/35	0.51	0.14	-0.51	-1.38	1.03	-1.87	0.13	0.22	0.14	-0.45	0.41	-0.12	-0.24	-0.96	0.20
5+Me/5+Mc	29/29	0.0	-0.91	-1.78	-0.95	-0.49	-0.21	0.76	-0.46	0.51	-1.37	-1.25	-0.38	-0.18	-0.44	-0.57
5-Fe/5-Fc	36/37	-0.13	-0.16	-0.08	1.57	0.35	0.42	0.33	-0.64	-0.60	1.45	-0.05	2.18*	0.90	-0.26	0.39
5+Fe/5+Fc	29/29	-0.58	-0.52	-1.93	0.79	0.75	-1.04	-0.36	0.66	-0.32	-0.15	0.49	-1.19	-0.66	0.05	1.24
5-M/5+M	70/58	-0.53	-0.82	-0.57	-0.55	1.47	-1.14	-0.87	-1.50	-0.37	-2.00*	0.47	-1.60	-0.99	-1.62	0.41
5-F/5+F	73/58	-0.26	-0.30	-1.50	-2.25*	-1.18	-2.05	-1.18	-1.14	0.82	-0.36	-0.82	-0.25	-1.57	-2.92**	-1.74
4M/4F	50/56	0.07	-0.15	0.76	-0.85	0.20	-0.65	-0.08	1.63	-0.43	-0.29	1.01	0.13	-0.13	1.25	1.20
5M/5F	128/131	-1.92	-1.96*	1.06	-0.46	-2.37*	-0.77	0.18	2.52*	-0.28	0.33	1.81	0.77	-0.13	0.95	2.27*

* .05 level of statistical significance
** .01 level of statistical significance

Figure 1

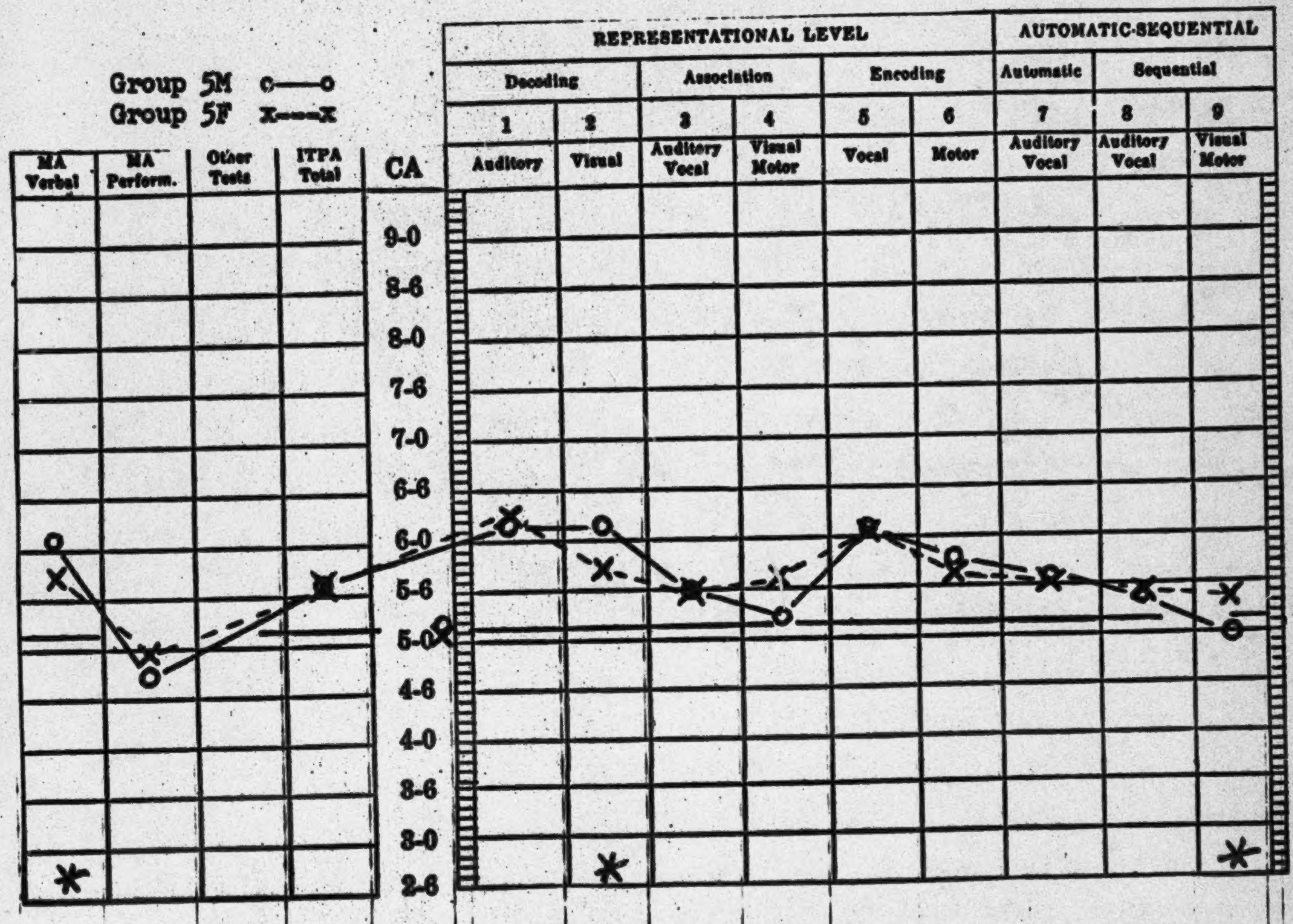
Profile of mean age levels for Groups 4 and 5



** = .01 level of confidence in statistical significance of differences.

Figure 2

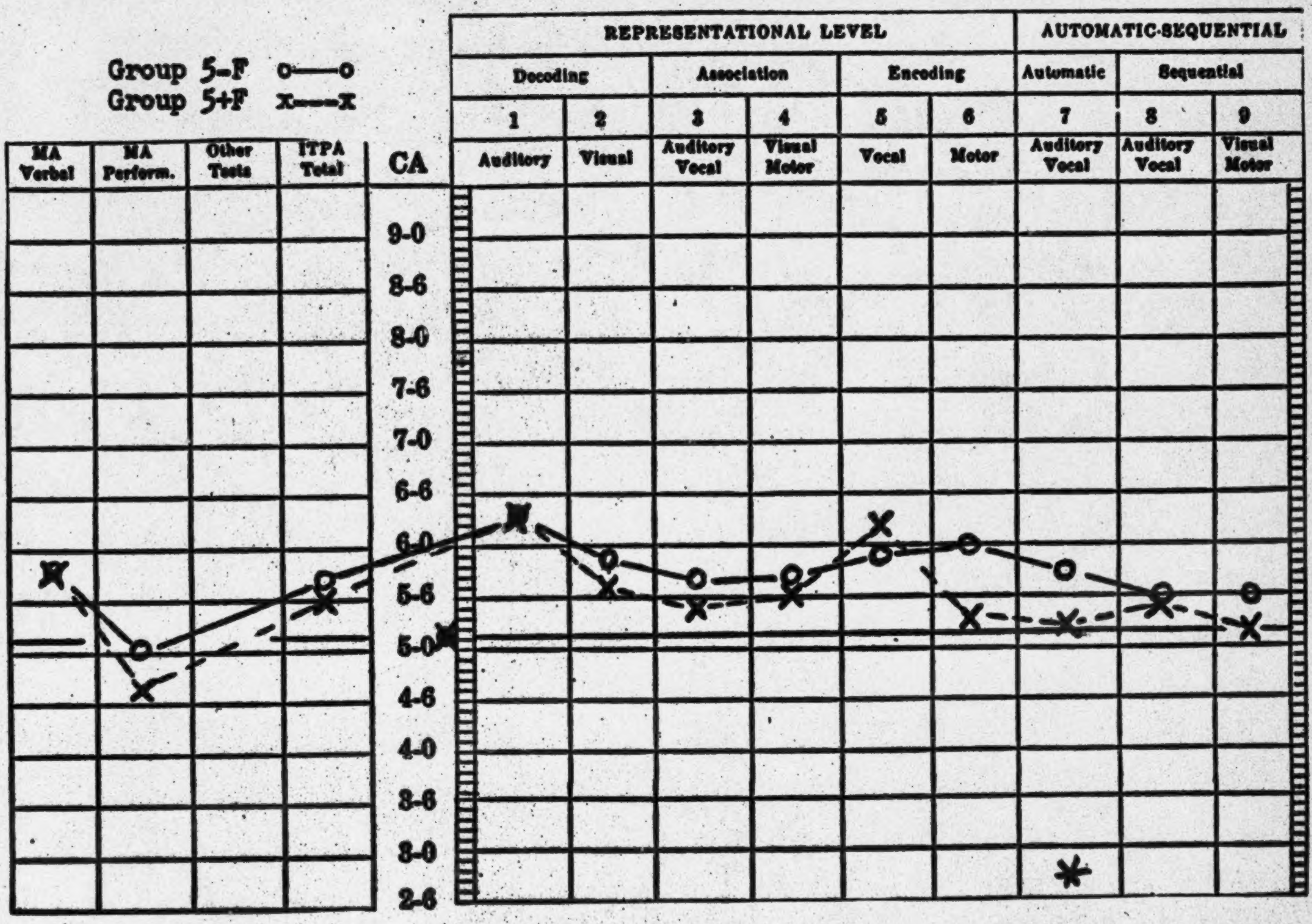
Profile of mean age levels for Groups 5M and 5F



* = .05 level of confidence in statistical significance of differences.

Figure 3

Profile of mean age levels for Groups 5-F and 5+F



* = .05 level of confidence in statistical significance of differences.

FIGURE 4

Profile of mean age levels for Groups 5-M and 5+M

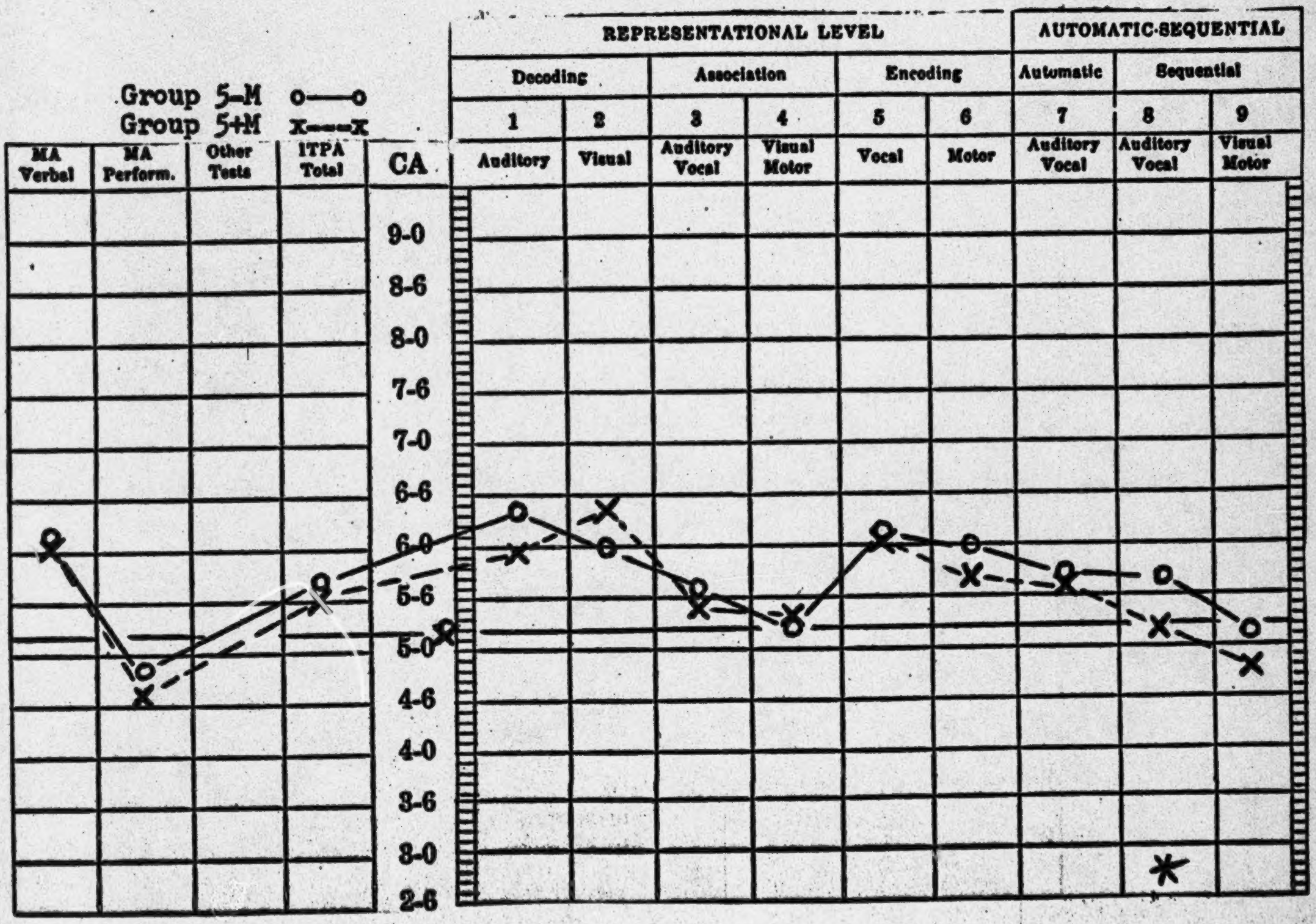


Figure 5

Profile of mean age levels for Groups 5+Fe and 5+Fc

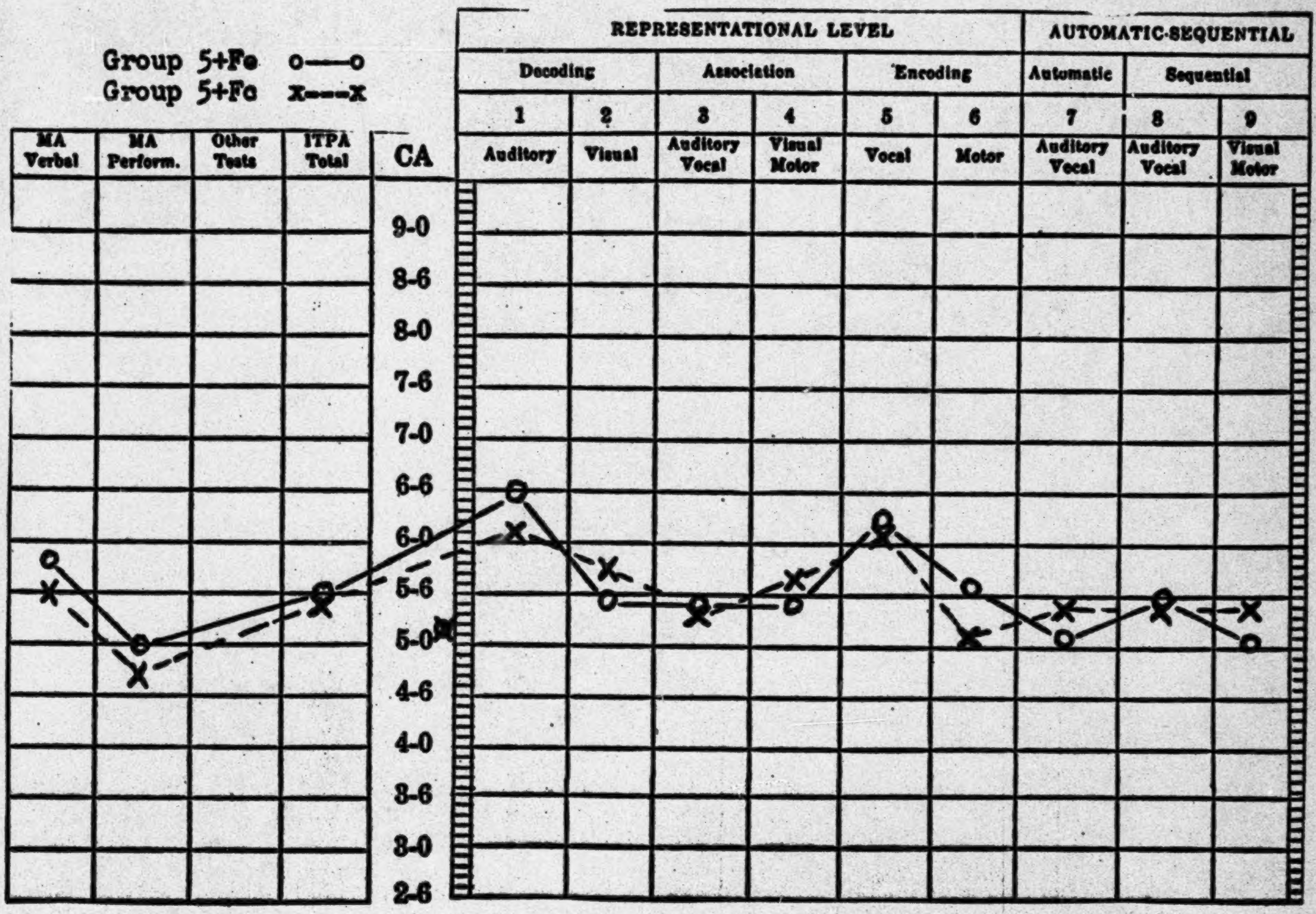
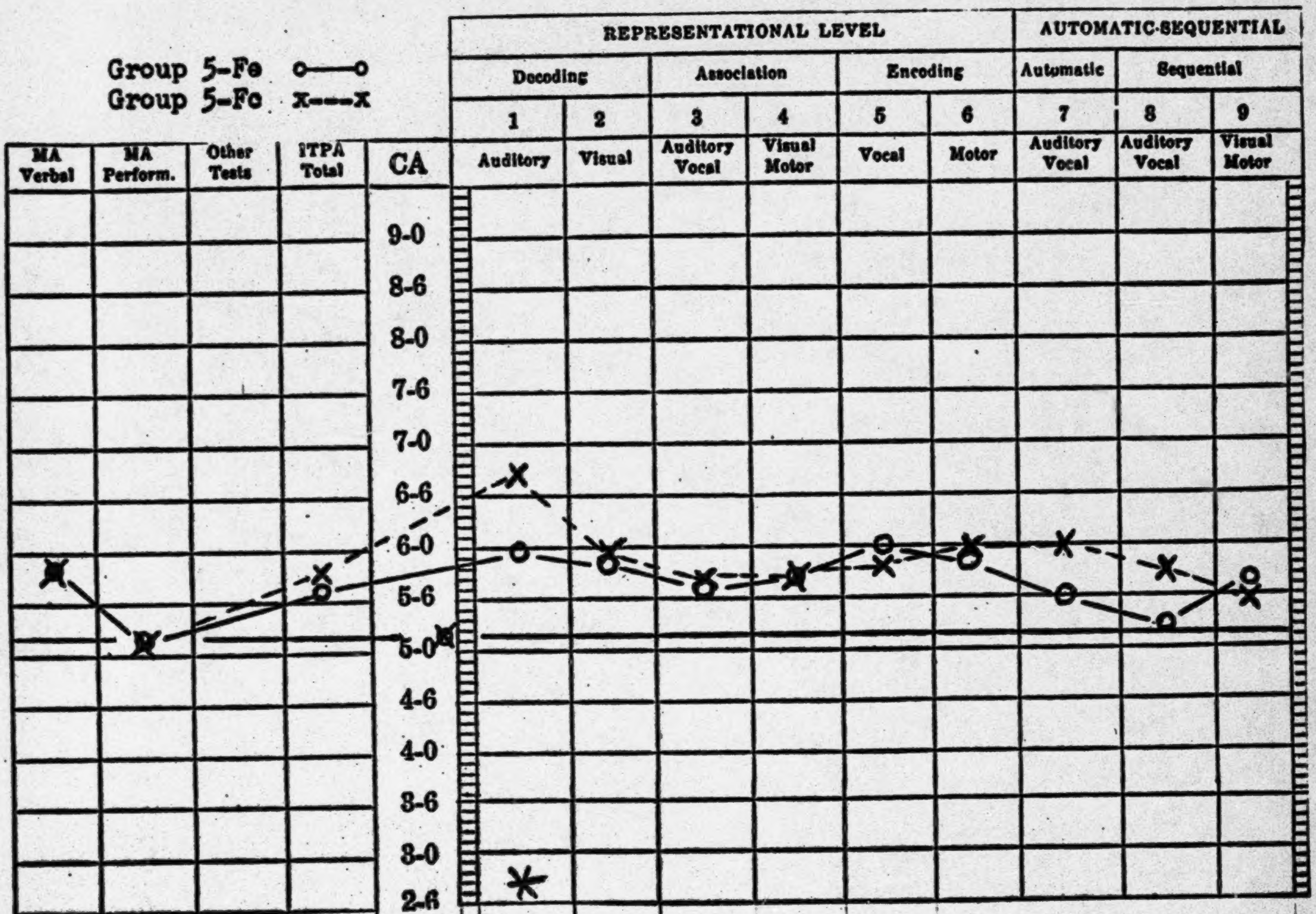


Figure 6

Profile of mean age levels for Groups 5-Fe and 5-Fc



* = .05 level of confidence in statistical significance of differences.

Figure 7

Profile of mean age levels for Groups 5+Me and 5+Mc

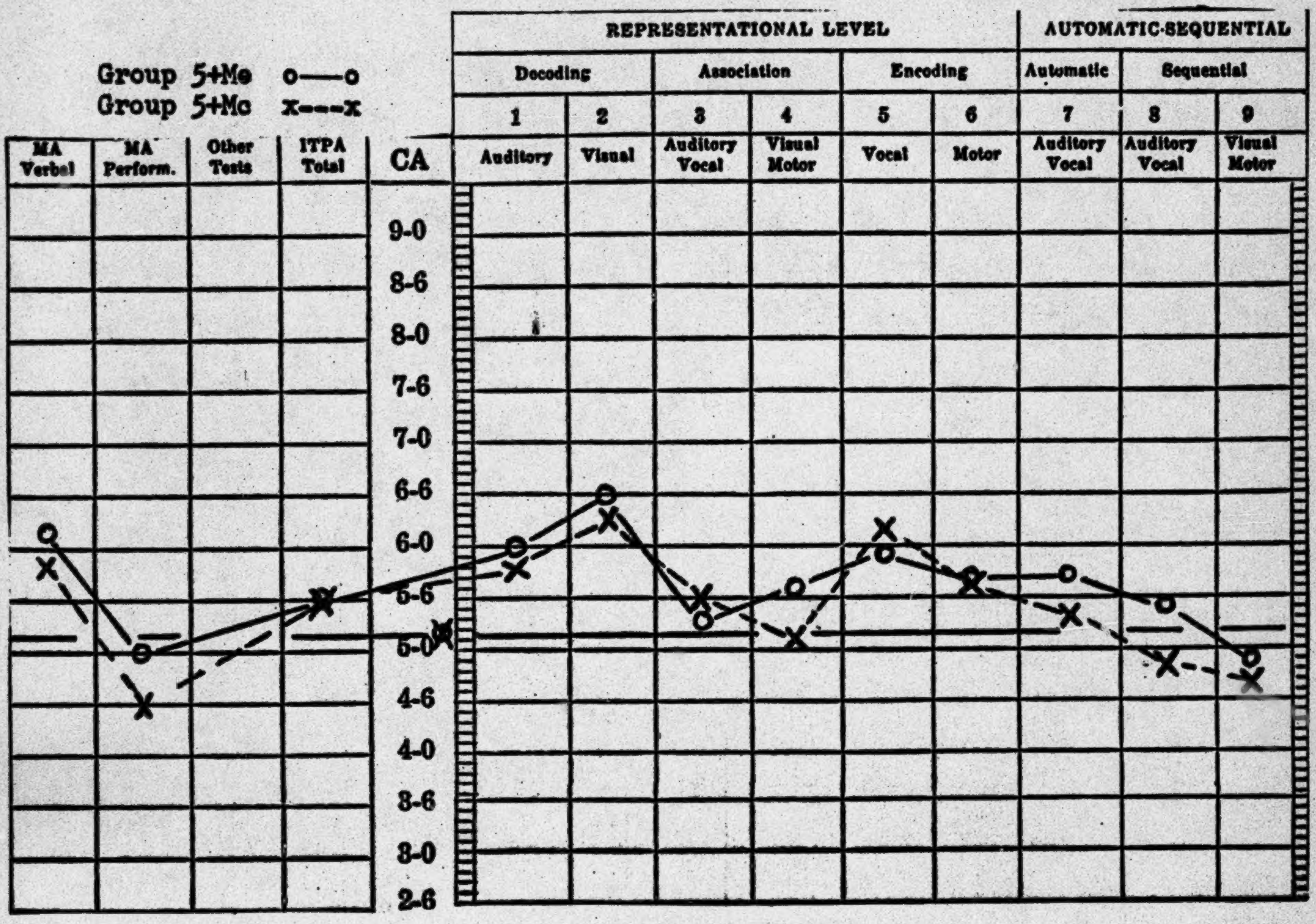


Figure 8

Profile of mean age levels for Groups 5-Me and 5-Mc

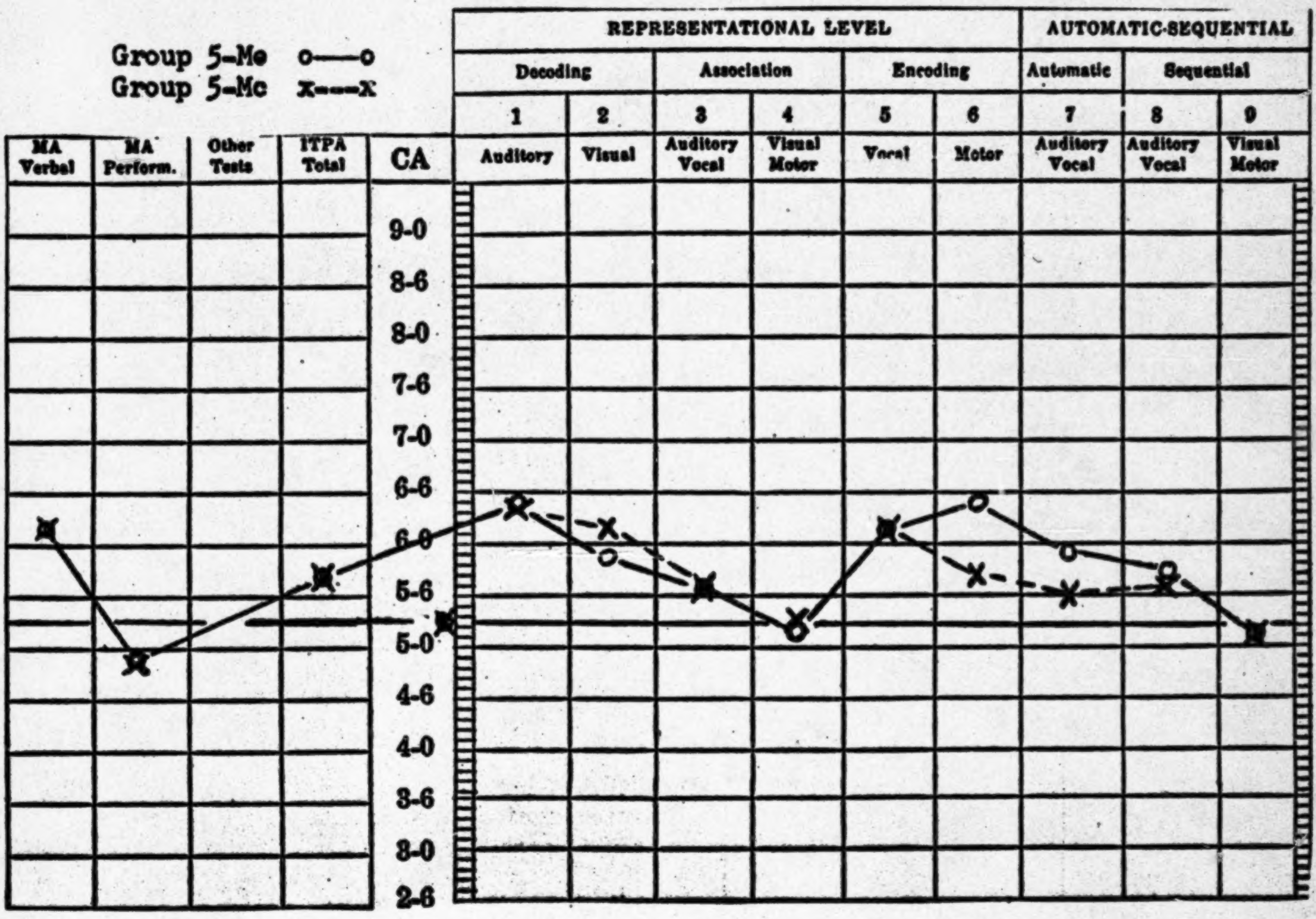


Figure 9

Profile of mean age levels for Groups 4-Fe and 4-Fc

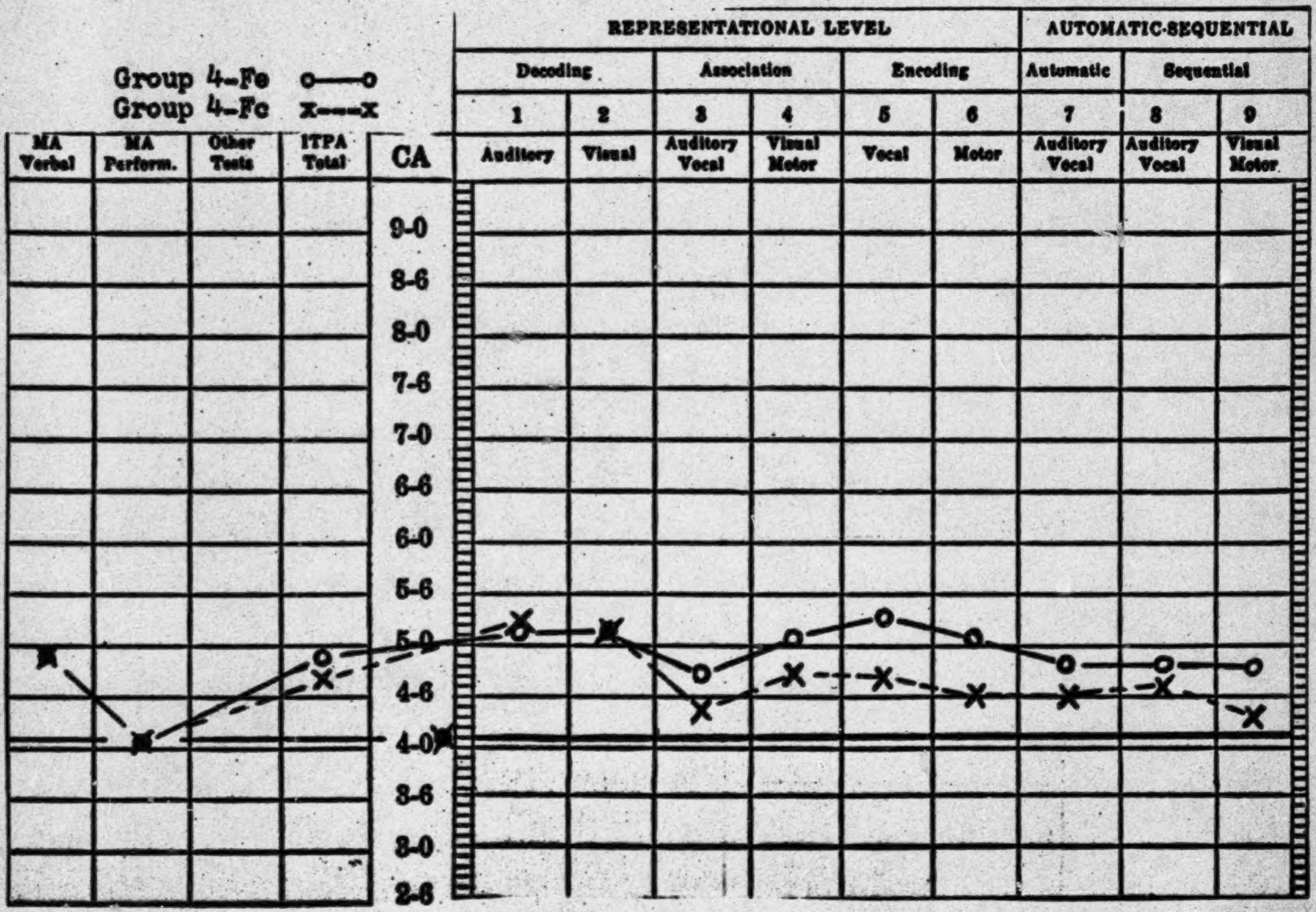


Figure 10

Profile of mean age levels for Groups 4-Me and 4-Mc

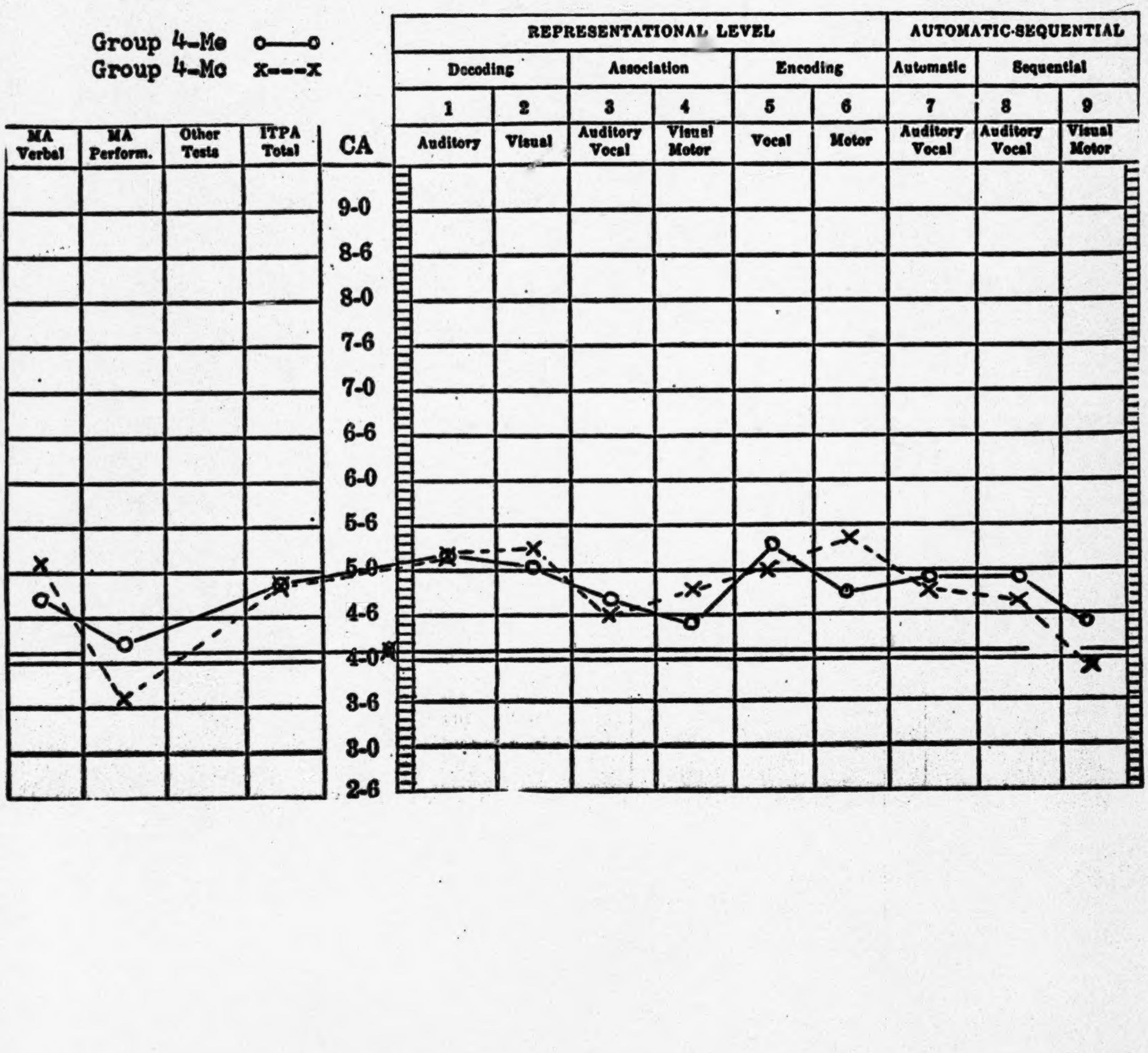


Table 4 shows the percent of individuals in each group whose test results, by individual subtests, were 12 months or more below their respective chronological age levels. (ITPA subtest numbers correspond to the tabled numbers.) It will be noted that there were a greater percentage of "failures" on certain subtests than on others and that there was considerable consistency in such patterns across all groups.

This analysis of "failures" is consistent with subtest patterns displayed in the profiles of means in Figures 1 through 10.

Further clarification of "failure" patterns was sought by combining subtest results according to the psycholinguistic processes of Decoding, Association, Encoding, and Sequencing as shown in Table 5. In general, this analysis indicated that there were about one-half as many Decoding deficits as there were Association, Encoding, and Sequencing deficits and that the proportions of deficits in the latter three processes were relatively equal.

Results shown in Table 4 were also combined in terms of psycholinguistic modalities of information processing, as shown in Table 6. There tended to be nearly twice as many Visual-Motor Channel deficits as there were Auditory-Vocal Channel deficits.

The raw data used to derive the percentages shown in Tables 4 through 6 will be found in Tables L through N in the Appendix.

Vision and Hearing Screening

Five children (4 boys and 1 girl) were referred by the school nurse for further visual examination on the basis of the visual screening results. Seven children (4 boys and 3 girls) were referred for further auditory examination on the basis of the auditory screening results. The incidence of "failure" on visual and auditory screening are shown in Table 7. It will be noted that there were very few "failures" on any of the visual screening variables with the exception of "Muscle Balance, Near Point." Similarly, there were few "failures" on the auditory screening variables, although there were two to three times as many failures for Right Ear Acuity than for other measures with the older group of children. Very few children "refused" the screening tasks.

Figure 11

Number of deficits of 12 months or more within each age scale subtest for the total sample. Dotted line represents the average number of deficits per subscale (41.5)

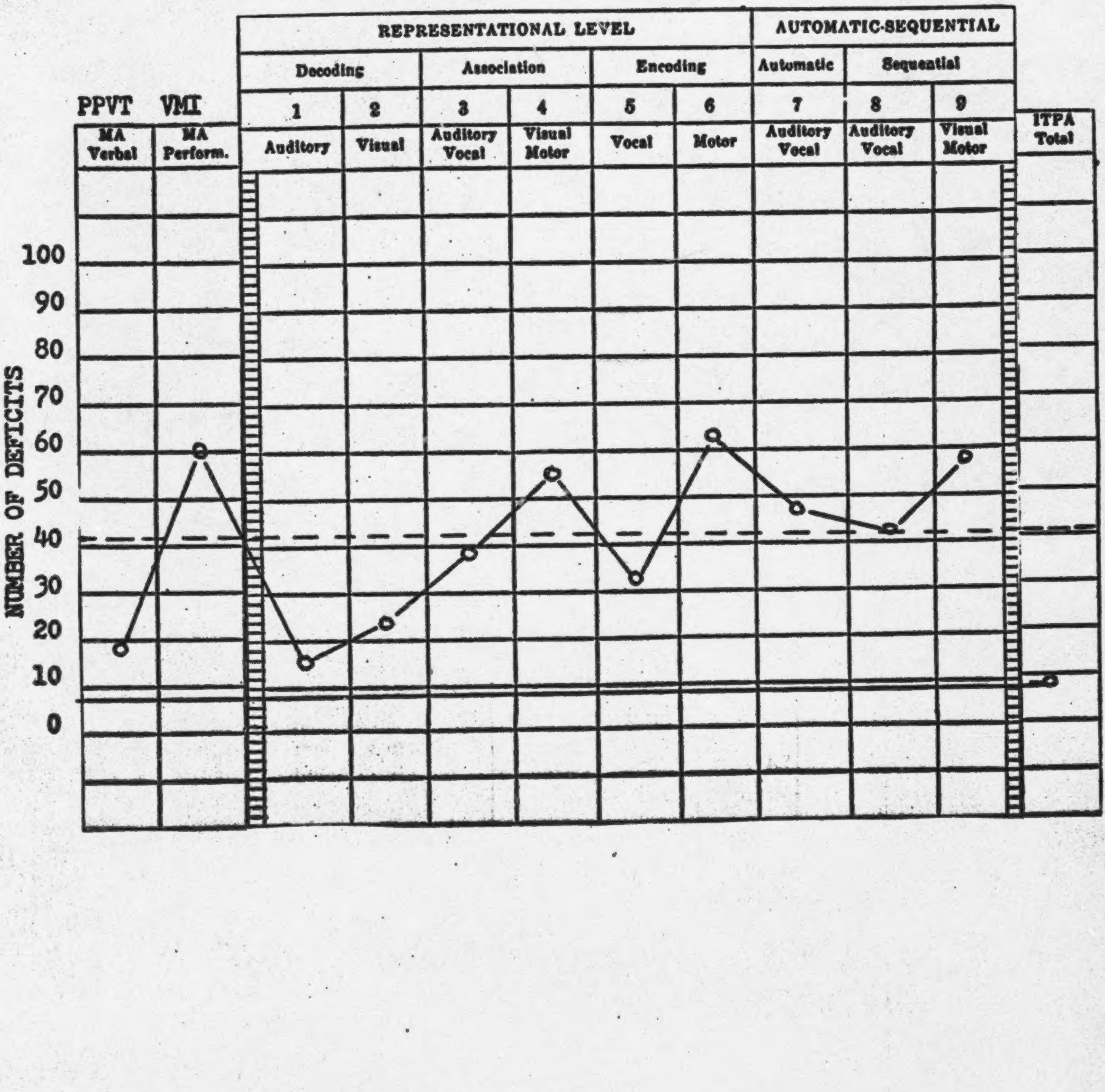


Table 4

PERCENT OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY INDIVIDUAL SUBTESTS OF AGE SCALES*

				REPRESENTATIONAL LEVEL						AUTOMATIC-SEQUENTIAL			
				Decoding		Association		Encoding		Automatic	Sequential		
		PPVT	VMI	1	2	3	4	5	6	7	8	9	
Group	N	MA Verbal	MA Perform.	Auditory	Visual	Auditory Vocal	Visual Motor	Vocal	Motor	Auditory Vocal	Auditory Vocal	Visual Motor	ITPA Total
4M	50	8	20	0	6	4	10	4	10	2	4	12	0
4F	56	8.9	17.9	8.9	1.8	8.9	14.3	3.6	21.4	12.5	10.7	7.1	1.8
5M	128	3.1	21.9	4.7	4.7	11.7	16.4	11.7	15.6	15.6	13.3	21.9	2.3
5F	131	3.8	9.2	3.8	10.7	13.0	16.0	10.7	19.8	15.3	13.0	15.3	3.1
4	106	8.5	18.9	4.7	3.8	6.6	12.3	3.8	16.0	7.5	7.5	9.4	.9
5	259	3.5	15.4	4.2	7.7	12.4	16.2	11.2	17.8	15.4	13.1	18.5	2.7
Total	365	4.9	16.4	4.4	6.6	10.7	15.1	9.0	17.3	13.2	11.5	15.9	2.2

*See Table L (Appendix) for raw data.

TABLE 5

PERCENT OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY PSYCHOLINGUISTIC PROCESSES

Group	N	N'	Decoding ITPA 1+2	Association ITPA 3+4	Encoding ITPA 5+6	Sequencing ITPA 8+9
4M	50	100	3.0	7.0	7.0	8.0
4F	56	112	5.4	11.6	12.5	8.9
5M	128	256	4.7	14.1	13.7	17.6
5F	131	262	7.3	14.5	15.3	14.1
4	106	212	4.2	9.4	9.9	8.5
5	259	518	6.0	14.3	14.5	15.8
Total	365	730	5.5	12.9	13.2	13.7

N' = Number of observations, since 2 scales (observations) are combined for each entry.

TABLE 6

PERCENT OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY PSYCHOLINGUISTIC MODALITIES

Group	N	N'	Auditory-Vocal PPVT + ITPA 1.3.5 & 8	Visual-Motor VMI + ITPA 2.4.6 & 9
4M	50	250	4.0	11.6
4F	56	280	8.2	12.5
5M	128	640	9.2	15.5
5F	131	655	8.9	14.2
4	106	530	6.2	12.1
5	259	1295	9.0	14.8
Total	365	1825	8.0	14.0

N' = Number of observations, since 5 scales (observations) are combined for each entry.

TABLE 7

INCIDENCE OF FAILURES ON VISION AND HEARING SCREENING
Criterion for failure: Visual Acuity, 20/40; Muscle Balance, Titmus instructions; Hearing, 25 decibels or more loss.

	VISUAL ACUITY				MUSCLE BALANCE				HEARING			
Groups	Right	Left	Both	"Refused"	Far	Near	Both	"Refused"	Right	Left	Both	"Refused"
4-Me	0	0	0	0	3	6	1	0	0	0	1	0
4-Mc	0	0	0	2	1	9	4	2	1	1	0	2
4-Fe	0	1	1	1	2	3	0	1	0	0	0	0
4-Fc	0	0	0	0	3	3	1	1	0	0	0	3
5-Me	0	1	0	0	2	5	3	0	4	0	2	0
5-Mc	1	0	0	0	1	6	0	0	3	2	1	0
5+Me	0	0	1	0	1	4	1	0	1	2	0	0
5+Mc	2	2	0	0	2	4	2	0	1	1	0	0
5-Fe	1	1	1	0	1	4	1	0	1	0	0	0
5-Fc	0	2	1	0	1	10	0	0	2	0	0	0
5+Fe	0	0	1	1	0	4	2	0	2	0	2	0
5+Fc	0	0	1	0	2	5	0	0	3	1	0	0
4-M	0	0	0	2	4	15	5	2	1	1	1	2
4-F	0	1	1	1	5	6	1	2	0	0	0	3
5-M	1	1	0	0	3	11	3	0	7	2	3	0
5+M	2	2	1	0	3	8	3	0	2	3	0	0
5-F	1	3	2	0	2	14	1	0	3	0	0	0
5+F	0	0	2	1	2	9	2	0	5	1	2	0
5M	3	3	1	0	6	19	6	0	9	5	3	0
5F	1	3	4	1	4	23	3	0	8	1	2	0
4	0	1	1	3	9	21	6	4	1	1	1	5
5	4	6	5	1	10	42	9	0	17	6	5	0

DISCUSSION

General

Response to the project by parents was extremely good throughout the screening program. Parents readily understood and agreed with the basic purposes of the study. In view of the fact that delays encountered in processing of the grant application prohibited formal public announcement of the project, until the last minute, enrollment of one-third of the children who might have been eligible is considered to be a strong indication of the positive cooperation to be expected from parents in the type of community in which the study was conducted. It is also noteworthy that the proportion of participants from each of the ten school neighborhoods was essentially the same, whereas it had been anticipated that a relatively low level of participation would be found among the older, lower economic neighborhoods. The involvement of parents as volunteers for purposes of enrolling participants and coordinating activities during screening sessions was notably successful. Similarly, involvement of parents of participating children in the actual screening sessions was a successful and valuable part of the procedure. Although such results are difficult to measure numerically, rapport between home and school, parental understanding of childhood individual differences, and parental appreciation of educational objectives were all judged to be significantly enhanced by parent participation in project activities. It is quite possible that differences between experimental and control group children will be reduced by this procedure, as parents of control and experimental group children alike were able to see relative developmental strengths and weaknesses of the children.

Procedurally, it was found that the original plan to have 8 to 10 children and their parents together in the kindergarten room for a block of time was not successful. This procedure was designed so that the children could be observed in group activities and so that screeners could have a ready "pool" of children and could release a child as soon as he began to tire but be able to continue screening after a rest. This procedure proved to be excellent with the first group in many respects because of the richness of opportunity for teachers, parents, and children to get acquainted with one another and for the adults to have meaningful discussions of child development and education. However, the procedure was abandoned after the first group of children was screened because the children enjoyed the classroom and its activities so greatly that they did not want to leave the room for screening! Research time and money did not permit the pursuit of this most enjoyable procedure, and it was necessary to establish individual appointments for each child. Screeners, in the revised procedure, kept a child with them until the child had finished all of the screening tasks. This change seemed appropriate for the older children, but required that the screener have considerably more time with a given child than had been originally planned because the children needed brief rest periods between tasks. Order of task administration was also changed so that a child did not have to sit for long periods of time, but could enjoy gross motor activities which were interspersed among the sitting activities. Even these adjustments were not sufficient for the comfort of the younger children, however, and the procedure would be improved from this standpoint by scheduling the children for two or more brief sessions with the screeners. On the other hand, scheduling problems are great in dealing with several hundred children.

The practice of rewarding the children with a colored star after completion of each subtest and of giving a gift when all stars were earned was an extremely important one under the circumstances; the difference, in fact, between getting and not getting the data for the study in many instances.

Referrals

Although it was recognized that predictive results would be impaired by removing obviously handicapped children from the study, this was done. Screening results of such children were forwarded immediately to family physicians. Several of the referred children were accepted into special education programs shortly thereafter; they and their parents were spared the experience of entering a regular kindergarten program in which they could not participate for more than a few days, and they have been given direction for dealing positively with their difficulties.

Teacher Screening

Success of matching experimental and control group appears to have been good. In terms of the major matching criterion, chronological age, the differences between matched groups ranged from 0.0 to 0.6 months. Differences between matched groups on the secondary criterion, mean language age on the ITPA, ranged from 0.0 to 1.9 months with the exception of the younger females, where the difference was 3.0 months in favor of the experimental group. Ideally, rematching would be done on these groups, but balance will have to be accomplished later by inclusion of additional subjects in this category. Screening data on the experimental group have already been made available to schools and physicians, so that rematching is not possible.

Although the differences were not great, it is of interest to note that the children whose parents chose to send them to the summer pre-kindergarten classes were slightly younger and two to two and one-half months behind in ITPA language age, on the average, the children who did not attend the summer session. These differences will have to be statistically treated in subsequent examination of differences in school achievement.

It is also of interest to note that, in this community and with these subjects, boys did as well as girls in both the younger and older groups, which appears to be contrary to the more usual finding that girls are more "ready" than boys as they approach kindergarten age. Of the three significant differences between older boys and girls, the boys actually did better on two than girls. We have no immediate way of knowing if this is a socio-economic phenomenon, a result of possible biasing of the sample associated with which children were enrolled, or some other variable, but the general absence of sex differences on the various subscales would seem to suggest that a socio-economic factor has made the growth and development of boys more similar to that of the girls in this community than in many other communities.

Enrollment bias seems to be evidenced in the comparison between the results of older and younger children, as the younger children performed at a higher level, relative to their chronological ages, than did the older children. (This apparent tendency for parents to bring in more "ready" younger children, may have implications for the finding that boys did as well as girls.) The main point to be noted in the younger vs. older sample comparisons, however, would seem to be that the profiles of subtest results are essentially identical. This finding suggests that (a) the screeners were not getting "random" results and (b) the results indicate a consistent community pattern. It is possible, of course, that the screeners were consistently biased so that the apparent "community pattern" is merely a reflection of the constancy of testing errors. It seems most likely, however, that these profiles are reflections of a community or intellectual level pattern, since they are virtually identical to the profile obtained by Bateman (2) from 50 upper-middle class suburban kindergarten children with average IQ's of 125. The only difference in the profiles is the relatively high level of performance of Bateman's sample on Auditory-Vocal Association. It seems likely that this difference is attributable to a generally higher level of intellectual functioning in Bateman's sample, since Auditory-Vocal Association correlates more highly with IQ than any other ITPA subtest. Only Mean Language Age on the ITPA correlates more highly with IQ than Auditory-Vocal Association. The Mean Language Age and the Auditory-Vocal Association Age for groups in the present study were between four and eight months above the groups' chronological age levels, suggesting that the present sample was composed of children with an average IQ somewhere between 107 and 116.

With few exceptions, the profiles for all the older and for all the younger children were mirrored in each of the subgroups under study, a finding which again would seem to support the notion that testing was reliable and reflected a community pattern. Examination of this general profile tempts one to make the sweeping generalization that the children were very proficient in dealing with "bits" of information, but were only able to perform at an essentially average level when required to integrate information either in the sense of associating ideas or of processing data from one "channel" to another. The tests on which they scored highest required that they identify or name somewhat isolated (and usually concrete) bits of information with relatively minimal demands being placed upon expressive abilities. They did least well in tests which required that they either associate ideas or select from a wide range of possible expressive responses the responses which corresponded to the information they had received. This latter difficulty seemed particularly true in tests which required integration of visual and motor channels, but was also true to some extent of those tests which required integration of auditory and vocal channels. In general, the children seemed to receive information more competently than they were able to either associate or express information. These findings would seem to suggest that the children, as a group, have had relatively great exposure to the world in which they live, but that they have had somewhat less stimulation, opportunity, or native ability to integrate and express this acquired information.

It is impossible to know at this time which variables or combination of variables will prove most effective in predicting future academic difficulties among the children. With respect to the age scales used in this study, there is evidence which indicates that ITPA subscales 7,8 and 9 (Kass (19) and the VMI (Beery and Buktenica (5) may be particularly sensitive to academic achievement difficulties, at least when administered at the same time as the academic tests. De Hirsch's (11) data would seem to support the notion that reproduction of forms and other "integrational" tasks may prove to be among the better predictors. Undoubtedly, some combination of variables will prove to be most highly predictive, and it is not unlikely that this combination will differ according to the criterion that is to be predicted. It may be, for example, that certain auditory-vocal variables may be more predictive of arithmetic difficulties. Although it is tempting to inspect Figure 11 and arrive at the conclusion that the visual-motor tasks were more "sensitive" to difficulties, one must ask the question, "Difficulties in what?". It is conceivable that a child might have severe visual-motor difficulties but be given an academic program which was highly auditory-vocal in content so that his difficulties might be of little consequence insofar as his success in that program were concerned. On the other hand, visual-motor tasks may be more sensitive to "integrational" or other more pervasive problems which might affect total functioning than some of the auditory-vocal tasks. In view of literature, however, the following predictive hypotheses are made with respect to the age variables in this study:

HYPOTHESIS I: Mean Language Age, and, to a lesser extent, Auditory-Vocal Association will be most predictive measures of pervasive learning difficulties ("slow learners").

HYPOTHESIS II: A combination of the VMI and ITPA subscales 3, 7, 8, and 9 will be most predictive of specific learning disorders (reading, spelling, arithmetic) and will also predict pervasive learning difficulties nearly as well as Mean Language Age.

HYPOTHESIS III: The VMI and ITPA subscale 9 will, in combination, be most predictive of arithmetic disorders and will contribute to prediction of spelling disorders to a greater extent than they will to reading disorders.

With regard to the rating scales used in this study, the Teacher Rating Scale of Behavior and the modified Kephart Perceptual-Motor Rating Scale have not yet been analyzed in detail. Ratings on each of the scales were simply summated in order to make gross comparisons of functional levels for group matching purposes. De Hirsch's data (11) and other literature would lead one to hypothesize that teacher ratings of restlessness and attention span may prove to be among the more predictive items among the Teacher Rating Scale. Results on the arm extension tests have not been analyzed as yet, but the great difficulty most teachers found in attempting to determine which arm moved in which direction suggests that these measures will lack predictive value, if for no other reason, because of unreliability of scoring.

Vision and Hearing Screening

It seems clear from the literature and from the small numbers of children in this sample who failed various portions of this aspect of the screening, that there is little likelihood that vision and hearing variables will be of predictive value for the majority of children who encounter learning difficulty. The only item in this area which would seem to have some potential value in this regard is the Titmus test for muscle balance at near point.

CONCLUSIONS

The results obtained from this initial screening phase of a longitudinal study appear to indicate:

1. Excellent public and parental cooperation may be obtained in attempts to screen all preschool children in a school district for potential learning difficulties.

2. Including parents in the organization and procedures involved in screening seems to be valuable from many standpoints, including an apparent increase of parental appreciation of individual differences among children and of early establishment of a "teamwork" rapport among parents and school personnel.

3. Preschool screening by kindergarten and primary teachers seems to generate a greater interest and awareness among the teachers of individual differences and of developmental factors related to educational and other growth aspects. These teachers appear to be able to make effective screeners, but they become anxious to convert concepts and other information gained during the screening exercises into improved teaching practices and were not satisfied to merely "test" for purposes of categorization. One of the greatest potential values of mass preschool screening may prove to be the stimulation and direction that such screening experience gives toward primary curriculum and teaching development.

4. Either a briefer battery or modified procedures for screening from those used in this study is needed if children below the age of four and one-half years of age are to be screened in a manner which is comfortable for them.

5. Insufficient numbers of children between the ages of three and one-half and four and one-half were enrolled in the initial screening and their numbers should be supplemented.

6. Matching of experimental and control groups was satisfactorily achieved.

7. Males subjects performed at as high a level as female subjects.

8. A community pattern seems to exist among upper-middle class children in which auditory-vocal functions are superior to visual-motor functions and in which acquisition of specific information is superior to integrated utilization of information.

9. Vision and Hearing Screening may prove to be of little predictive value for the majority of children who will eventually experience learning difficulties.

SUMMARY

This is a report of the initial phase of a longitudinal project directed towards preschool prediction and prevention of learning disorders among a general population of preschool children. All of the children between the ages of three and one-half and five and one-half years of age in a school district composed of primarily middle and upper-middle socio-economic families were invited to local schools during the summer for purposes of screening of "readiness" abilities by primary teachers and of visual and auditory abilities by a school nurse. 396 children were enrolled for the screening. Parents helped to organize the program, and parents of children who were screened observed all of the screening procedures carried out with their own children. Results of the screening were used to match experimental and control groups. Control group results will not be released until the conclusion of the four year study and will provide the data for retrospective analysis of which combination of screening tasks best predicted eventual academic achievement in school. Screening results for the experimental groups were sent to schools and family physicians in the hope that this information would lead to preventative assistance to children before they encountered difficulty in school. It was also hoped that the project would provide stimulation to teachers for development of improved primary curriculum and teaching practices.

This report contains information regarding the degree of success achieved in matching experimental and control groups, group patterns of performance on the screening batteries, and initial analyses of screening tasks upon which children tended to do poorly. Among the observations were: (a) boys and girls differed little in performance levels, (b) test patterns revealed relative deficits among groups in visual-motor functioning and relative strengths among groups in the decoding, or reception, of information, and (c) few children failed vision and hearing tasks with the exception of muscle balance at near point.

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TABLE A

Means, Standard Deviations, and Product Moment Correlations for Groups 4-Me and 4-Mc

STATISTICS FOR GROUP 4-Me

MEANS	49.16	60.92	43.00	57.60	62.56	63.72	54.36	47.20	59.72	55.76	57.52	62.04	57.75	27.48	9.76
SIGMAS	2.99	16.06	17.38	13.85	13.51	23.25	14.95	10.28	16.76	22.02	16.45	12.44	10.54	9.30	3.23
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.40	1.00													
3	.37	.64	1.00												
4	.12	.27	.38	1.00											
5	.13	.40	.64	.18	1.00										
6	.46	.52	.66	.41	.64	1.00									
7	.51	.61	.52	.47	.37	.57	1.00								
8	.29	.31	.41	.08	.03	.26	.35	1.00							
9	.36	.33	.61	.02	.43	.47	.48	.28	1.00						
10	.34	.66	.47	-.08	.36	.46	.34	.47	.32	1.00					
11	.13	.32	.23	-.05	.35	.36	.00	.09	.21	.61	1.00				
12	.39	.65	.62	.11	.56	.47	.56	.30	.43	.62	.36	1.00			
13	.51	.64	.71	.24	.49	.69	.65	.60	.58	.76	.47	.73	1.00		
14	.48	.44	.30	.17	.12	.38	.50	.77	.31	.54	.20	.24	.59	1.00	
15	.55	.76	.56	.13	.34	.66	.53	.33	.39	.42	.28	.47	.54	.45	1.00

STATISTICS FOR GROUP 4-Mc

MEANS	49.44	56.96	51.00	59.00	60.56	55.92	56.44	53.12	62.96	59.56	52.88	62.32	57.72	30.48	11.96
SIGMAS	2.53	16.05	15.00	15.02	16.41	17.68	12.34	12.64	16.55	10.57	13.74	15.44	9.80	4.66	3.32
1	1.00														
2	.53	1.00													
3	.62	.40	1.00												
4	.15	.64	.17	1.00											
5	.20	.33	.58	.39	1.00										
6	.49	.68	.30	.60	.20	1.00									
7	.42	.54	.55	.45	.54	.30	1.00								
8	.45	.62	.43	.25	.43	.56	.54	1.00							
9	.48	.52	.44	.42	.42	.60	.59	.53	1.00						
10	.30	.30	.32	.42	.49	.21	.70	.33	.58	1.00					
11	.49	.19	.49	.28	.13	.16	.32	.01	.28	.24	1.00				
12	.29	.31	.24	.44	.13	.41	.54	.36	.43	.29	.34	1.00			
13	.56	.60	.54	.65	.51	.64	.77	.61	.82	.73	.43	.67	1.00		
14	.37	.44	.50	.32	.27	.41	.40	.61	.26	.13	.34	.30	.42	1.00	
15	.05	.19	.29	.12	.26	.11	.21	.25	.15	-.11	-.15	.22	.15	.11	1.00

TABLE B

Means, Standard Deviations, and Product Moment Correlations for Groups 4-Fe and 4-Fc

STATISTICS FOR GROUP 4-Fe

MEANS	49.22	58.66	48.70	57.59	62.18	60.88	57.07	57.51	63.81	58.55	61.33	62.14	59.03	30.77	11.51
SIGMAS	3.66	11.68	10.11	16.79	12.99	19.87	16.46	15.36	17.44	24.84	20.91	17.25	11.85	6.40	3.54
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.21	1.00													
3	.40	.58	1.00												
4	.20	.57	.49	1.00											
5	.08	.34	.53	.51	1.00										
6	-.00	.25	.29	.10	.30	1.00									
7	.36	.45	.27	.64	.49	.15	1.00								
8	.29	.60	.35	.20	-.10	.03	.01	1.00							
9	.26	.46	.48	.62	.36	.10	.64	.20	1.00						
10	.23	.29	.20	.39	.34	.22	.63	.07	.44	1.00					
11	.19	.05	.24	.25	.35	.31	.48	-.30	.13	.53	1.00				
12	.24	.23	.20	.52	.34	.11	[illegible]	-.27	.36	.38	.65	1.00			
13	.37	.58	.52	.74	.54	.31	.84	.20	.70	.77	.60	.67	1.00		
14	.27	.41	.54	.38	.47	.31	.24	.37	.13	.27	.21	.15	.45	1.00	
15	.31	.14	.24	-.15	-.00	.42	.15	.19	.17	.36	.19	.05	.27	.38	1.00

STATISTICS FOR GROUP 4-Fc

MEANS	49.44	58.37	49.37	54.10	62.13	53.82	53.41	52.03	56.27	54.62	56.55	63.03	55.96	30.86	11.72
SIGMAS	3.20	15.01	10.60	15.58	18.08	20.12	13.15	17.45	17.40	20.56	22.64	20.34	11.14	8.78	2.68
1	1.00														
2	.36	1.00													
3	.38	.41	1.00												
4	.19	.50	.60	1.00											
5	.15	.37	.35	.32	1.00										
6	.19	.60	.49	.26	.34	1.00									
7	.22	.54	.61	.68	.39	.52	1.00								
8	.33	.30	.42	.49	.19	.04	.15	1.00							
9	.20	.52	.52	.51	.45	.55	.63	.29	1.00						
10	.14	.48	.19	.41	-.08	.18	.33	.17	.18	1.00					
11	.05	.64	.37	.46	.21	.67	.51	.16	.45	.48	1.00				
12	.45	.46	.62	.47	.23	.46	.56	.32	.50	.11	.45	1.00			
13	.41	.73	.72	.72	.52	.63	.74	.49	.76	.35	.68	.78	1.00		
14	-.02	.16	.34	.21	.40	.21	.20	.33	.34	-.15	.14	.06	.26	1.00	
15	.41	.35	.38	.30	.22	.21	.34	.43	.29	.04	-.00	.08	.35	.46	1.00

TABLE C

Means, Standard Deviations, and Product Moment Correlations for Groups 5-Me and 5-Mc

STATISTICS FOR GROUP 5-Me

MEANS	62.40	74.25	58.94	70.80	70.60	76.80	66.85	61.48	73.74	69.14	61.82	76.94	68.51	35.11	12.45
SIGMAS	4.24	11.55	15.43	16.79	16.25	20.77	13.18	15.59	19.08	19.81	18.73	20.22	11.51	8.95	4.50
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.49	1.00													
3	.35	.12	1.00												
4	.21	.53	.39	1.00											
5	.26	.20	.00	.30	1.00										
6	.39	.51	.18	.50	.43	1.00									
7	.34	.59	.31	.73	.32	.50	1.00								
8	.05	.07	.31	.26	.01	.03	.12	1.00							
9	.04	.38	.40	.66	.26	.30	.56	.20	1.00						
10	.08	.47	.36	.52	-.21	.19	.48	.25	.38	1.00					
11	.24	.39	.33	.69	.40	.48	.46	.18	.47	.30	1.00				
12	.24	.44	.05	.44	.16	.30	.47	.16	.39	.53	.25	1.00			
13	.35	.61	.47	.86	.37	.64	.76	.39	.70	.61	.75	.61	1.00		
14	.39	.35	.45	.48	.12	.24	.38	.37	.34	.51	.41	.28	.54	1.00	
15	.20	.38	-.02	.27	.06	.14	.19	.11	.24	.18	.29	-.08	.24	.57	1.00

STATISTICS FOR GROUP 5-Mc

MEANS	62.97	74.65	57.20	65.62	74.48	67.57	67.34	62.25	74.45	67.25	63.48	76.37	67.88	33.05	12.65
SIGMAS	5.02	11.73	13.20	14.55	15.32	20.49	16.99	13.58	24.04	14.95	14.41	19.41	10.56	8.95	3.75
1	1.00														
2	-.05	1.00													
3	.29	-.16	1.00												
4	-.14	.49	.13	1.00											
5	.03	.38	.31	.49	1.00										
6	.18	.50	.01	.25	.45	1.00									
7	.27	.54	.10	.39	.35	.56	1.00								
8	.27	.35	.24	.15	.42	.37	.24	1.00							
9	.22	.60	.09	.51	.28	.50	.57	.38	1.00						
10	.06	.13	.57	.33	.21	.26	.20	.35	.43	1.00					
11	-.06	.14	.13	.08	.11	.29	.26	.14	.06	.42	1.00				
12	.51	.39	.05	.22	.49	.46	.51	.35	.43	.15	.03	1.00			
13	.25	.58	.26	.54	.57	.62	.73	.61	.77	.57	.30	.62	1.00		
14	-.31	.33	.01	.43	.26	.11	.14	.12	.32	.27	.14	.11	.32	1.00	
15	-.04	.02	.16	.17	.02	-.07	.08	-.04	.12	.22	-.03	.02	.09	.65	1.00

TABLE D

Means, Standard Deviations, and Product Moment Correlations for Groups 5+Me and 5+Mc

STATISTICS FOR GROUP 5+Me

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	62.31	74.34	59.86	68.79	77.96	68.58	63.58	58.68	71.34	65.03	67.03	72.06	66.62	32.20	12.96
SIGMAS	3.21	12.76	6.54	18.67	19.35	20.82	11.26	16.63	19.13	20.81	19.92	15.95	9.79	8.11	2.36
1	1.00														
2	.05	1.00													
3	.02	.14	1.00												
4	.29	.45	.31	1.00											
5	-.03	.20	.24	.17	1.00										
6	.12	.09	.33	.35	.23	1.00									
7	.29	[illegible]	.06	.58	.18	.46	1.00								
8	-.08	[illegible]	.50	.32	.33	.38	.12	1.00							
9	.53	.47	.01	.35	-.00	.06	.48	-.14	1.00						
10	.01	.33	.34	.50	.24	.41	.32	.25	.20	1.00					
11	.01	.49	.39	.51	.58	.26	.35	.69	.08	.45	1.00				
12	.31	.34	.15	.36	-.26	.21	.26	.05	.29	.20	.16	1.00			
13	.26	.53	.42	.75	.44	.57	.68	.59	.43	.65	.78	.43	1.00		
14	.18	.24	.36	.32	.45	.25	.35	.15	.25	.39	.41	-.08	.47	1.00	
15	-.04	-.05	.20	.02	.20	.05	.04	.15	-.28	.08	.18	.01	.08	.25	1.00

STATISTICS FOR GROUP 5+Mc

MEANS	62.31	70.17	53.41	64.31	75.75	67.44	66.24	56.62	74.10	57.75	61.17	70.06	66.17	31.37	12.62
SIGMAS	3.67	21.23	18.37	17.17	14.72	19.94	15.16	17.43	22.02	19.72	15.47	23.16	9.70	6.04	2.21
1	1.00														
2	.02	1.00													
3	-.15	.54	1.00												
4	.24	.43	.39	1.00											
5	-.14	.42	.45	.45	1.00										
6	.27	-.05	-.04	.19	.15	1.00									
7	.23	.43	.26	.62	.21	.41	1.00								
8	.42	.45	.16	.36	.20	.35	.59	1.00							
9	.21	.19	.33	.26	.21	.23	.27	.28	1.00						
10	-.06	.18	.07	.19	.22	-.15	.16	.14	-.09	1.00					
11	-.00	.09	-.01	.15	-.10	-.08	.12	-.01	-.16	.49	1.00				
12	-.12	.24	.24	-.01	.09	-.04	.30	.06	-.06	.46	.54	1.00			
13	.25	.45	.45	.57	.51	.59	.70	.68	.54	.18	-.05	.08	1.00		
14	.31	.59	.44	.72	.38	.34	.77	.58	.48	.35	.26	.25	.79	1.00	
15	.09	.33	.32	.02	.14	.04	.40	.23	.14	-.00	-.00	.42	.32	.28	1.00

TABLE

Means, Standard Deviations, and Product Moment Correlations for Groups 5-Fe and 5-Fc

STATISTICS FOR GROUP 5-Fe

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	61.69	70.22	60.77	66.50	70.38	70.58	67.30	67.61	72.75	63.66	68.44	71.75	67.41	35.44	14.00
SIGMAS	4.87	17.67	9.24	13.22	14.23	22.15	15.33	12.21	19.19	13.08	16.57	16.22	8.87	7.29	3.92
1	1.00														
2	.08	1.00													
3	.37	.14	1.00												
4	.26	-.22	.12	1.00											
5	.14	.03	.04	.11	1.00										
6	.25	.21	.32	.27	.19	1.00									
7	.11	-.06	.34	.44	.10	.34	1.00								
8	.38	.02	.49	-.00	.18	.10	.32	1.00							
9	.10	.01	.49	.35	-.12	.35	.62	.17	1.00						
10	-.10	.04	.15	.05	.20	.02	.31	.37	.22	1.00					
11	.21	.07	.22	-.03	.11	.15	.14	.14	.25	.00	1.00				
12	-.02	-.19	.19	.20	.20	.14	.78	.41	.40	.27	.03	1.00			
13	.29	-.06	.50	.47	.35	.53	.80	.50	.67	.45	.38	.68	1.00		
14	.49	-.11	.50	.43	.33	.43	.48	.49	.39	.07	.35	.32	.65	1.00	
15	.42	.15	.36	.19	.33	.27	.24	.42	.20	.07	.10	.17	.32	.38	1.00

STATISTICS FOR GROUP 5-Fc

MEANS	61.56	69.56	60.51	72.13	71.81	72.81	68.40	65.56	70.02	68.94	68.24	80.67	69.40	35.02	14.32
SIGMAS	3.65	16.92	17.07	17.20	20.19	23.38	12.85	15.07	19.29	17.67	17.64	18.72	9.98	6.38	3.08
1	1.00														
2	.36	1.00													
3	.40	.53	1.00												
4	.17	.23	.06	1.00											
5	.05	-.06	.06	.48	1.00										
6	.10	-.01	.01	.26	-.00	1.00									
7	.05	.15	.00	.62	.43	.14	1.00								
8	.38	.32	.23	.29	.15	.17	.20	1.00							
9	-.16	.39	.11	.23	.19	.21	.40	.06	1.00						
10	-.03	-.07	.20	.33	.36	.08	.49	.05	.03	1.00					
11	.12	.03	.08	.31	.18	.20	.26	-.03	.22	.22	1.00				
12	.08	.14	.31	.09	.05	-.04	.18	-.10	.19	.35	.14	1.00			
13	.11	.11	.08	.81	.57	.30	.77	.24	.36	.68	.48	.32	1.00		
14	.53	.48	.46	.39	.12	-.11	.17	.53	-.03	.13	.08	.10	.26	1.00	
15	.30	.02	.19	.41	.12	.19	.34	.67	-.07	.20	.10	.18	.40	.45	1.00

TAB[illegible] F

Means, Standard Deviations, and Product Moment Correlations for Groups 5+Fe and 5 Fc

STATISTICS FOR GROUP 5+Fe

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	61.72	70.27	60.17	61.17	65.62	66.72	65.44	61.37	75.44	65.62	64.62	78.17	66.58	32.20	12.41
SIGMAS	4.01	13.18	9.34	16.06	20.10	21.87	16.66	15.96	22.82	15.88	18.19	20.80	10.66	4.64	3.69
1	1.00														
2	.12	1.00													
3	.32	.23	1.00												
4	.10	.64	.19	1.00											
5	-.35	.07	.25	.29	1.00										
6	.14	.29	.25	.42	.04	1.00									
7	.39	.59	.44	.79	.20	.54	1.00								
8	.13	.05	.46	.14	.19	.67	.35	1.00							
9	.10	.57	.26	.47	-.14	.40	.52	.27	1.00						
10	-.02	.12	.15	.00	-.00	.25	.03	.07	.25	1.00					
11	.26	-.06	.31	.15	.24	.20	.30	.37	.04	-.04	1.00				
12	.07	.39	.26	.52	.10	.38	.59	.27	.38	.15	.26	1.00			
13	.18	.50	.49	.72	.30	.69	.84	.59	.64	.29	.44	.71	1.00		
14	.54	.33	.45	.33	-.19	.15	.44	.33	.47	.16	.08	.18	.41	1.00	
15	.29	.38	.51	.24	.11	.21	.40	.33	-.01	-.04	-.05	.12	.20	.37	1.00

STATISTICS FOR GROUP 5+Fc

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	61.17	67.58	54.58	64.68	69.20	61.03	63.86	64.82	73.48	64.86	66.96	72.82	64.79	32.27	13.65
SIGMAS	3.21	24.34	12.48	17.63	15.82	19.86	16.48	23.17	23.86	21.40	18.54	12.53	10.04	5.19	3.91
1	1.00														
2	.42	1.00													
3	.18	.53	1.00												
4	.51	.52	.16	1.00											
5	.30	.45	.36	.55	1.00										
6	.24	.15	.30	.32	.54	1.00									
7	.47	.58	.11	.66	.51	.29	1.00								
8	.42	.41	.16	.27	.35	-.04	.16	1.00							
9	.21	.41	.32	.26	.54	.48	.43	.37	1.00						
10	-.22	.23	.17	.21	.22	.00	.19	.19	.20	1.00					
11	.26	-.02	.11	.09	.40	.39	.09	.42	.46	.04	1.00				
12	.08	.11	-.18	-.02	-.09	-.03	.09	.25	.06	-.21	-.03	1.00			
13	.39	.57	.31	.63	.78	.57	.61	.59	.70	.34	.51	.14	1.00		
14	.06	.10	.01	.35	.40	.44	.37	.07	.48	.24	.18	-.25	.47	1.00	
15	.03	.27	.00	.04	.22	.23	.15	.25	.30	.19	.25	.03	.52	.38	1.00

TA[illegible]G

Means, Standard Deviations, and Product Moment Correlations for Groups 4-M and 4-F

STATISTICS FOR GROUP 4-M

MEANS	49.30	58.94	47.00	58.30	61.56	59.82	55.40	50.16	61.34	57.66	55.20	62.18	57.72	28.98	10.86
SIGMAS	2.74	16.02	16.57	14.32	14.91	20.82	13.61	11.79	16.56	17.20	15.18	13.88	10.07	7.44	3.42
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.45	1.00													
3	.48	.48	1.00												
4	.13	.45	.28	1.00											
5	.16	.37	.56	.30	1.00										
6	.45	.59	.45	.47	.42	1.00									
7	.47	.56	.53	.45	.44	.44	1.00								
8	.36	.43	.45	.18	.24	.32	.44	1.00							
9	.42	.41	.54	.23	.42	.49	.53	.42	1.00						
10	.32	.49	.42	.08	.36	.36	.43	.39	.39	1.00					
11	.27	.28	.29	.09	.24	.30	.12	.01	.22	.46	1.00				
12	.34	.45	.41	.30	.30	.42	.54	.32	.43	.44	.34	1.00			
13	.53	.62	.61	.44	.50	.65	.70	.58	.69	.71	.45	.69	1.00		
14	.44	.38	.38	.21	.14	.33	.46	.66	.29	.47	.20	.24	.50	1.00	
15	.32	.40	.47	.13	.26	.32	.38	.34	.29	.25	.02	.32	.33	.36	1.00

STATISTICS FOR GROUP 4-F

MEANS	49.33	58.51	49.05	55.78	62.16	57.23	55.17	54.67	59.91	56.51	58.85	62.60	57.44	30.82	11.62
SIGMAS	3.40	13.39	10.27	16.12	15.69	20.14	14.82	16.56	17.67	22.60	21.76	18.75	11.49	7.66	3.10
1	1.00														
2	.29	1.00													
3	.39	.48	1.00												
4	.19	.52	.53	1.00											
5	.12	.36	.42	.39	1.00										
6	.08	.44	.39	.20	.32	1.00									
7	.29	.48	.42	.66	.41	.33	1.00								
8	.30	.41	.38	.36	.08	.06	.10	1.00							
9	.22	.48	.48	.57	.40	.36	.64	.27	1.00						
10	.19	.38	.19	.40	.10	.21	.51	.13	.33	1.00					
11	.11	.40	.31	.37	.26	.51	.50	-.02	.32	.51	1.00				
12	.35	.37	.44	.48	.27	.29	.62	.07	.42	.24	.52	1.00			
13	.38	.65	.61	.74	.51	.48	.81	.37	.73	.58	.65	.72	1.00		
14	.10	.25	.42	.27	.42	.24	.21	.33	.25	.04	.16	.09	.33	1.00	
15	.35	.24	.30	.04	.11	.31	.22	.29	.21	.23	.09	.06	.30	.40	1.00

[redacted]

Means, Standard Deviations, and Product Moment Correlations for Groups 5-M and 5+M

STATISTICS FOR GROUP 5-M

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	62.68	74.45	58.07	68.21	72.54	72.18	67.10	61.87	74.10	68.20	62.65	76.65	68.20	34.08	12.55
SIGMAS	4.62	11.56	14.28	15.81	15.80	21.00	15.09	14.52	21.55	17.45	16.61	19.68	10.97	8.94	4.12
1	1.00														
2	.19	1.00													
3	.31	-.01	1.00												
4	.02	.50	.28	1.00											
5	.15	.29	.13	.36	1.00										
6	.26	.49	.11	.41	.40	1.00									
7	.30	.55	.20	.53	.33	.51	1.00								
8	.16	.20	.28	.21	.20	.18	.18	1.00							
9	.15	.50	.23	.56	.27	.39	.57	.29	1.00						
10	.06	.32	.44	.44	-.04	.22	.33	.28	.39	1.00					
11	.09	.28	.25	.43	.28	.37	.35	.16	.26	.34	1.00				
12	.38	.42	.05	.34	.31	.37	.48	.24	.41	.37	.16	1.00			
13	.29	.60	.38	.71	.45	.62	.73	.48	.73	.59	.56	.61	1.00		
14	.00	.34	.25	.46	.17	.20	.24	.25	.32	.41	.28	.20	.43	1.00	
15	.08	.22	.05	.22	.04	.03	.13	.05	.18	.20	.16	-.03	.17	.59	1.00

STATISTICS FOR GROUP 5+M

MEANS	62.13	72.25	56.63	66.55	76.86	68.01	64.91	57.65	72.72	61.39	64.10	71.06	66.39	31.79	12.79
SIGMAS	3.42	17.49	14.05	17.92	17.08	20.21	13.30	16.92	20.49	20.43	17.92	19.73	9.66	7.10	2.27
1	1.00														
2	.03	1.00													
3	-.10	.47	1.00												
4	.26	.43	.34	1.00											
5	-.08	.31	.32	.29	1.00										
6	.20	.00	.05	.28	.20	1.00									
7	.25	.40	.18	.57	.18	.42	1.00								
8	.19	.29	.24	.34	.27	.37	.38	1.00							
9	.35	.27	.21	.29	.09	.15	.35	.08	1.00						
10	-.02	.25	.16	.37	.24	.14	.20	.20	.03	1.00					
11	.00	.26	.13	.37	.33	.11	.21	.37	-.04	.48	1.00				
12	.03	.27	.22	.14	-.07	.06	.28	.06	.06	.34	.35	1.00			
13	.26	.46	.40	.66	.47	.58	.68	.64	.48	.42	.41	.22	1.00		
14	.23	.40	.35	.48	.43	.29	.53	.34	.34	.38	.36	.09	.60	1.00	
15	.02	.17	.27	.03	.18	.05	.23	.20	-.07	-.03	.11	.24	.19	.26	1.00

TA[illegible]

Means, Standard Deviations, and Product Moment Correlations for Groups 5-F and 5+F

STATISTICS FOR GROUP 5-F

MEANS	61.63	69.89	60.64	69.35	71.10	71.71	67.86	66.57	71.36	66.34	68.34	76.27	68.42	35.23	14.16
SIGMAS	4.27	17.18	13.68	15.52	17.40	22.65	14.04	13.68	19.16	15.70	17.00	17.98	9.43	6.80	3.50
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.20	1.00													
3	.35	.37	1.00												
4	.20	.02	.07	1.00											
5	.09	-.02	.05	.35	1.00										
6	.18	.09	.11	.26	.07	1.00									
7	.09	.03	.12	.52	.27	.24	1.00								
8	.37	.18	.31	.16	.15	.13	.25	1.00							
9	-.00	.20	.23	.26	.06	.27	.51	.11	1.00						
10	-.06	-.02	.18	.26	.31	.06	.39	.16	.09	1.00					
11	.16	.05	.12	.16	.15	.18	.19	.04	.23	.13	1.00				
12	.02	-.02	.25	.17	.11	.05	.47	.07	.26	.34	.09	1.00			
13	.20	.02	.20	.68	.49	.41	.78	.34	.49	.59	.43	.48	1.00		
14	.50	.16	.44	.39	.20	.16	.34	.50	.19	.09	.22	.19	.44	1.00	
15	.37	.09	.24	.29	.21	.23	.28	.53	.07	.14	.09	.18	.35	.41	1.00

STATISTICS FOR GROUP 5+F

MEANS	61.44	68.93	57.37	62.93	67.41	63.87	64.65	63.10	74.46	65.24	65.79	75.50	65.68	32.24	13.03
SIGMAS	3.61	19.44	11.29	16.81	18.02	20.90	16.45	19.80	23.16	18.68	18.24	17.23	10.30	4.88	3.82
1	1.00														
2	.28	1.00													
3	.25	.44	1.00												
4	.28	.53	.14	1.00											
5	-.10	.26	.26	.41	1.00										
6	.19	.19	.30	.35	.23	1.00									
7	.43	.56	.25	.71	.33	.42	1.00								
8	.26	.31	.23	.23	.27	.24	.23	1.00							
9	.15	.45	.29	.35	.15	.44	.48	.32	1.00						
10	-.12	.20	.16	.13	.10	.11	.12	.15	.22	1.00					
11	.25	-.04	.17	.12	.31	.28	.19	.40	.25	.00	1.00				
12	.09	.22	.10	.27	.02	.25	.39	.22	.25	-.00	.13	1.00			
13	.28	.52	.39	.66	.49	.64	.73	.56	.67	.31	.47	.50	1.00		
14	.31	.17	.17	.34	.08	.29	.40	.17	.48	.21	.13	.00	.43	1.00	
15	.15	.28	.16	.14	.17	.19	.26	.29	.14	.09	.11	.05	.34	.38	1.00

TABLE

Means, Standard Deviations, and Product Moment Correlations for Groups 5M and 5F

STATISTICS FOR GROUP 5M

MEANS	62.51	73.46	57.42	67.46	74.50	70.29	66.10	59.96	73.47	65.11	63.31	74.12	67.38	33.04	12.66
SIGMAS	4.11	14.53	14.14	16.75	16.47	20.67	14.30	15.73	21.01	19.09	17.16	19.82	10.40	8.21	3.40
VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.11	1.00													
3	.15	.25	1.00												
4	.12	.45	.31	1.00											
5	.05	.28	.21	.31	1.00										
6	.23	.22	.09	.35	.29	1.00									
7	.28	.46	.19	.54	.25	.48	1.00								
8	.17	.26	.26	.28	.21	.28	.28	1.00							
9	.22	.37	.23	.43	.18	.29	.48	.19	1.00						
10	.03	.28	.31	.41	.07	.20	.28	.26	.22	1.00					
11	.05	.26	.19	.40	.31	.25	.28	.26	.12	.40	1.00				
12	.25	.33	.13	.25	.11	.24	.40	.17	.26	.37	.24	1.00			
13	.28	.51	.39	.68	.44	.61	.71	.55	.63	.51	.48	.45	1.00		
14	.08	.36	.29	.47	.25	.24	.35	.30	.33	.40	.30	.17	.50	1.00	
15	.06	.17	.11	.14	.09	.03	.15	.09	.10	.10	.14	.04	.17	.49	1.00

STATISTICS FOR GROUP 5F

MEANS	61.54	69.46	59.19	66.51	69.47	68.24	66.44	65.03	72.74	65.85	67.21	75.93	67.21	33.90	13.66
SIGMAS	3.98	18.15	12.74	16.36	17.70	22.16	15.18	16.69	21.00	17.02	17.54	17.59	9.88	6.19	3.67
1	1.00														
2	.23	1.00													
3	.32	.40	1.00												
4	.23	.27	.12	1.00											
5	.01	.11	.15	.39	1.00										
6	.18	.14	.20	.32	.15	1.00									
7	.23	.30	.19	.62	.31	.34	1.00								
8	.31	.25	.27	.21	.22	.19	.24	1.00							
9	.06	.33	.24	.29	.10	.33	.48	.22	1.00						
10	-.08	.09	.17	.19	.21	.09	.25	.15	.16	1.00					
11	.20	.01	.15	.15	.23	.23	.20	.24	.24	.07	1.00				
12	.05	.09	.19	.21	.07	.13	.43	.15	.25	.17	.11	1.00			
13	.23	.27	.29	.67	.49	.52	.75	.47	.57	.45	.45	.49	1.00		
14	.43	.16	.37	.39	.17	.24	.37	.35	.27	.14	.19	.13	.45	1.00	
15	.28	.19	.22	.24	.20	.23	.28	.40	.09	.12	.11	.12	.36	.41	1.00

[redacted] K

Means, Standard Deviations, and Product Moment Correlations for Groups 4 and 5

STATISTICS FOR GROUP 4

VAR.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	49.32	58.71	48.08	56.97	61.87	58.45	55.28	52.54	60.58	57.05	57.13	62.40	57.57	29.95	11.26
SIGMAS	3.09	14.62	13.58	15.28	15.26	20.41	14.19	14.61	17.09	20.15	18.94	16.56	10.79	7.57	3.26
1	1.00														
2	.35	1.00													
3	.41	.47	1.00												
4	.17	.48	.37	1.00											
5	.13	.36	.48	.35	1.00										
6	.24	.52	.40	.32	.36	1.00									
7	.36	.52	.46	.57	.42	.38	1.00								
8	.32	.40	.39	.28	.14	.15	.22	1.00							
9	.30	.44	.49	.43	.41	.42	.59	.32	1.00						
10	.23	.42	.29	.28	.20	.27	.48	.21	.35	1.00					
11	.16	.33	.28	.26	.25	.41	.35	.00	.27	.49	1.00				
12	.34	.39	.39	.41	.28	.34	.59	.15	.42	.30	.47	1.00			
13	.44	.63	.58	.62	.51	.56	.76	.43	.71	.63	.57	.71	1.00		
14	.23	.31	.39	.24	.30	.27	.32	.46	.26	.20	.18	.15	.40	1.00	
15	.33	.32	.41	.07	.18	.31	.29	.32	.24	.23	.07	.17	.31	.39	1.00

STATISTICS FOR GROUP 5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MEANS	62.02	71.44	58.32	66.98	71.95	69.25	66.27	62.52	73.10	65.49	65.28	75.03	67.29	33.48	13.16
SIGMAS	4.06	16.55	13.45	16.53	17.25	21.42	14.72	16.39	20.96	18.04	17.43	18.71	10.12	7.26	3.57
1	1.00														
2	.19	1.00													
3	.22	.31	1.00												
4	.17	.35	.22	1.00											
5	.04	.20	.17	.35	1.00										
6	.21	.18	.14	.33	.22	1.00									
7	.25	.36	.19	.58	.28	.40	1.00								
8	.22	.23	.27	.24	.19	.22	.26	1.00							
9	.14	.34	.23	.36	.14	.31	.48	.20	1.00						
10	-.02	.17	.25	.30	.13	.14	.26	.21	.19	1.00					
11	.11	.10	.17	.27	.25	.23	.24	.26	.17	.24	1.00				
12	.15	.19	.16	.23	.08	.18	.41	.16	.25	.28	.18	1.00			
13	.26	.37	.34	.68	.46	.56	.73	.50	.60	.48	.46	.47	1.00		
14	.22	.24	.33	.43	.20	.23	.35	.32	.30	.29	.25	.15	.47	1.00	
15	.15	.16	.17	.19	.13	.13	.22	.27	.09	.11	.14	.09	.26	.45	1.00

TABLE L

INSTANCES OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY INDIVIDUAL SUBTESTS OF AGE SCALES*

				REPRESENTATIONAL LEVEL						AUTOMATIC-SEQUENTIAL			
				Decoding		Association		Encoding		Automatic	Sequential		
		PPVT	VMI	1	2	3	4	5	6	7	8	9	
Group	N	MA Verbal	MA Perform.	Auditory	Visual	Auditory Vocal	Visual Motor	Vocal	Motor	Auditory Vocal	Auditory Vocal	Visual Motor	ITPA Total
4M	50	4	10	0	3	2	5	2	5	1	2	6	0
4F	56	5	10	5	1	5	8	2	12	7	6	4	1
5M	128	4	28	6	6	15	21	15	20	20	17	28	3
5F	131	5	12	5	14	17	21	14	26	20	17	20	4
4	106	9	20	5	4	7	13	4	17	8	8	10	1
5	259	9	40	11	20	32	42	29	46	40	34	48	7
Total	365	18	60	16	24	39	55	33	63	48	42	58	8

*See Table 4 for percentage conversions of these data.

TABLE M

INSTANCES OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY PSYCHOLINGUISTIC PROCESSES*

Group	N	Decoding ITPA 1+2	Association ITPA 3+4	Encoding ITPA 5+6	Sequencing ITPA 8+9
4M	50	3	7	7	8
4F	56	6	13	14	10
5M	128	12	36	35	45
5F	131	19	38	40	37
4	106	9	20	21	18
5	259	31	74	75	82
Total	365	40	94	96	100

*See Table 5 for percentage conversion of these data.

TABLE N

INSTANCES OF PERFORMANCE LEVELS 12 MONTHS OR MORE BELOW CHRONOLOGICAL AGES: BY PSYCHOLINGUISTIC MODALITIES*

Group	N	Auditory-Vocal PPVT + ITPA 1,3,5 & 8	Visual-Motor VMI + ITPA 2,4,6 & 9
4M	50	10	29
4F	56	23	35
5M	128	59	99
5F	131	58	93
4	106	33	64
5	259	117	192
Total	365	150	256

*See Table 6 for percentage conversions of these data.

READINESS ROUND-UP - 1966

Suggestions for Teachers of Experimental Group

Results of our vision, hearing, and teacher's screening from this summer are enclosed for the children (approximately one-half of those seen) in the Experimental Group. You will not receive results on the Control Group until the conclusion of the study (3 to 4 years). As you know, we have formed these groups in order to see if we can (a) predict and (b) minimize or prevent learning difficulties by screening at an early age and by making results available to physicians and schools. The children in the research project are those who did not seem, according to our results, to have severe difficulties. Children who did seem to have severe problems have already been referred to their physician and to the San Rafael City Schools nurses' and/or psychologists' offices. Please note, however, that not all children who may be in your classes came to the Round-up, so that lack of screening results may not necessarily indicate that a child is in the Control Group.

In fact, we want to emphasize that you should continue to refer children to the nurse, psychologist, speech thereapist, etc., even though they have been seen in the Readiness Round-Up. In other words, do not do anything less than you would have done had we not begun this study. On the other hand, we certainly hope that the screening results will be of value to you in terms of being able to do more for the children with severe problems and for those in the Experimental Group. Some of the screening techniques that were used will, of course, be unfamiliar to you, but we think that you need not have a detailed background in them in order to glean some direction as to activities that might be helpful to the children, either in the classroom or at home. Essentially, we looked at the childrens' abilities to (1) receive information, (2) associate information, and (3) express information. We tried to see how well they could carry out these processes in the visual, auditory, tactile-kinesthetic, motor, and verbal areas. As anticipated, a given child did some things better than others, and we have attempted to indicate these strengths and weaknesses for you in hopes that you will consider ways in which you and/or the parents can help the child to (1) capitalize on his strengths and (2) shore up his weaknesses. We believe that by having a little more detailed information about the child's abilities, you will be able to draw upon your own materials, techniques, and creativity to meet his developmental needs somewhat more than they might be met otherwise.

I have included some "starter" suggestions for activities in various of the areas screened. Would you be so kind as to jot down additional ideas that you may have along these lines (preferably on 5 X 8 cards) and share them with me so that I might pass them along to other teachers who are trying to help their children? No matter how obvious or simple the idea may seem, it may be just the ticket for some child or group of children, so PLEASE make at least a few cards! The teachers who participated in the screening this summer may be able to help you with ideas. They have selected various areas into which to delve a little more deeply than others, so that you might wish to consult with them.

Visual Learning:	Brandenberger, Sharon Hinshaw, Zelma	
Auditory Learning:	Merwin, Margaret Pidcoe, Anne	
Tactile-Kinesthetic:	Geiger, Patricia Wilson, Barbara	
Motor Learning:	Juncker, Marilyn Newcomb, Mary Ann	(Nurse) (KMR School)
Verbal Learning:	Cornell, Lorna Frye, Julia	
Behavioral Learning:	Jensen, Lois Norris, Donna	

A word about parent conferences: The screening scores and profiles are for your use. Do not quote these scores or show them to the parents. These are screening results and should not be taken too literally in terms of age levels and the like. We find that parents do take the scores and profiles too seriously and that more harm than good is done unless more time than you will be able to take is given to helping the parents understand the meaning of the scores and profiles. Simply state, verbally, the indicated areas of strength and weakness, noting which area seems to be the strongest and which seems to be the weakest. (Because of testing error, do not consider a result an indication of a strength or weakness UNLESS the child scores ONE YEAR OR MORE above or below his own age level. Even though a child did very well in some area (e.g. was at the 8-year-old level in auditory learning) do not do him the disservice of quoting that level; merely say that he did quite well, that it seems to be a real area of strength for him.

Please do not hesitate to ask questions of me. I can be reached by leaving word with Mrs. Hazeltine, extension 223. Thank you very much and good teaching.

Keith E. Beery, Ph.D.,
Project Director,
Readiness Round-Up

KEB/dr

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October 28, 1966

Readiness Round-Up, 1966

Dear Doctor:

Over 400 children between the ages of 3½ and 5½, who will attend the San Rafael City Schools in the near future, were screened for vision, hearing, perception, and other abilities believed to be of possible importance to their eventual achievement in school. This research project is directed toward the possibility of early identification and prevention of learning disorders among a general population of children. The success of our efforts will be measured against the childrens' actual school achievement during the next few years.

We have attempted to identify the children with the greatest indications of deficiency. These children (up to five per cent in any major category of functioning) are all being brought to the attention of their physician and of their school of future attendance. The word "REFER" will be found on the face sheet of information sent to you about any patient of yours in this category (who was screened this summer).

The remaining children (approximately 95 per cent) will be divided into experimental and control groups. All screening data on the experimental group will be forwarded to the child's physician and school even though a severe deficiency was not indicated by the screening. Data on the control group will be withheld for a period of three to four years. It is our hope that, even though severe deficiencies were not indicated by the screening among these children, that mild to moderate deficiencies will be noted by the physician and school and that these professional resources will counsel the parents or otherwise aid the child in his development. For example, we have noted that many families in this community provide their children with a great deal of auditory and verbal experience but little by way of visual-motor experience. These children may display developmental lags in the visual-motor areas and become candidates for frustration on the playground, in writing, and in other academic activities requiring visual-motor integration. Such children may benefit a great deal from a suggestion by the physician that clay, scissors, blocks, balls, and more outdoor activity be included in the pre-school experiences at home.

A few words of explanation regarding the data:-

"Psycholinguistic" terminology has been used in identifying the functions measured on the Illinois Test of Psycholinguistic Abilities.

"Visual Decoding" means visual input, or the ability to understand information gained through the visual channel.

"Motor Encoding" means motor output, or the ability to express information through the motor channel (gesture).

"Auditory-Vocal Automatic" is a test of the child's grammatical development.

"Sequencing" is the ability to maintain information in the order of presentation.

The DFS is a visual-motor test which requires the child to copy geometric forms.

The PPVT is a test of the child's auditory vocabulary.

All of the foregoing have been expressed in graphic form in terms of DEVELOPMENTAL AGE. The numbers under the heading "CA" on the graph are the age equivalents (e.g. 2-6 equals two years and six months developmental age).

The results of a perceptual-motor rating scale are indicated by the number encircled in the upper right of the face sheet, which is a total score representing the child's abilities to balance, identify his body parts, initiate right and left movements in the limbs, and to lift his chest and his legs off the floor while prone. Quartile scores, based upon our population of about 400, are:

	AGES				
	3½ - 4	4 - 4½	4½ - 5	5 - 5½	5½ - 6
Lower Quartile	0 - 8	0 - 9	0 - 10	0 - 11	0 - 12
Upper Quartile	12 - 20	14 - 20	15 - 20	16 - 20	17 - 20

Finally, a rating scale completed by our teacher-screeners may be of value.

We are the first to point out that not only do the screening instruments contain error, but there is bound to be error of varying degrees in the results associated with other factors, such as the relative inexperience of the teacher-screeners. Obviously, numerical scores should not be given too much credence. It would seem most appropriate to note indicated strengths and weakness of functioning in context with professional observation and experience with the child and family.

Please Note: All results sent out October 28, 1966, are for children who were not listed as "severe" on the basis of the teacher screening. However, it is our hope that even these children might benefit from this added information which has been sent to you and to the school.

I will be happy to discuss the project in general or any of your patients with you.

Sincerely yours,

Keith E. Beery, Ph.D.,
Project Director.

Arthur R. Ablin, M. D.,
Medical Consultant.

KEB/dr
Encls -

SAN RAFAEL CITY SCHOOLS

READINESS ROUND - UP - 1966

Vision and Hearing Testing

VISUAL SCREENING RESULTS

All children were screened by a school nurse with the Titmus Vision Tester. In some cases, re-screening was done and a Snellen Chart was used. If no mark is made in the acuity boxes below, the child passed at 20/30 or better. Only "failing" results are recorded for any of the screening tasks.

(Child)

(Birthdate)

(Code No.)

Acuity		Muscle Balance	
R	L	Far	Near

Re-Screening

Acuity		Muscle Balance	
R	L	Far	Near

PURE-TONE AUDIOMETRIC RESULTS

Children were screened at 15 decibels.

Screening

Ear	500	1000	2000	4000
R				
L				

Threshold Test #1

250	500	1000	2000	3900	4000	[illegible]

Threshold Test #2

Ear	250	500	1000	2000	3000	4000	6000
R							
L							

Comments:

Keith E. Beery, Ph.D.
Project Director.